feb/mar 2018 issue 1 volume 1

.au retro-magazine

palcotronic

extraordinary visions of future's amazing past!

quantum link

interactive fiction

nintendo's NES

amiga's soundtracker

the jackintosh

interviews:

steve wozniak talks disk II

jason scott and 4am

stewart cheifet revisits CES

...and so much more!

Thousands of products have made their **debuts** at the **Consumer Electronics Show**, held in **Las Vegas** (and elsewhere) since **1967**.

Here are some of their stories...

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EXPERIENCE THE THIRD DIMENSION

THE NEXT GENERATION APPLE IIE EMULATOR

SCORE = 0
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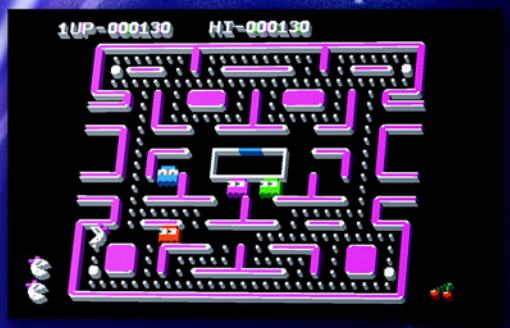
paleotronic microM8



Only microM8 from Paleotronic gives you the power to play Apple II/IIe compatible games in 3D

Get it now from microM8.com for Windows, MacOS and Linux!

paleotronic

ZERO PAGE

WELCOME TO THE CES JUNGLE

The Consumer Electronics Show was a mecca of raw, untamed capitalism, and it was every gadget for itself.

Our first full issue explores the history of consumer electronics through the lens of the Consumer Electronics Show. We'll be looking at a number of products that would go on to become huge successes, and a few that really, really didn't.

If you were a "technology enthusiast" (AKA a "geek") and were lucky enough to get a pass to CES, it was a bit like winning Willy Wonka's Golden Ticket — except that instead of chocolate, there were stereos, televisions, computers, video games and just about anything else new with a transistor or a microchip.

Building through the 1960s and early 1970s, it was the late 1970s and 1980s where the consumer electronics industry really exploded, and CES was in its heyday. Magazine covers of the time touted their coverage of the event, and readers eagerly bought them, hoping to learn which potential "next big things" had been unveiled there – and then spending month and months praying their favourites actually made it to market (which was not always the case.)

For unless you were a big brand with a solid sales channel you could find a tepid response from CES attendees to be a death knell for your product. The general public isn't usually invited to CES – it is a trade show, meant for resellers, media and industry insiders, and if you can't convince these folks of the value (and by that I mean actual retail value) of your product, well, no orders means no financing, and no financing means no production, and no production means...well, you know what it means.

We know what that means too, but happily, enough people contributed to our Kickstarter that we get to have a crack at starting a magazine. (Thanks everyone!)

And so, we thought the Consumer Electronics Show was a fitting topic for the first full issue of *Paleotronic Magazine* – it's not just the subject of our feature article, but a thread that runs through the entire issue, with each department focussing on a product that either lived or died after appearing at CES.

We'll look at the 8-track, the Commodore Pet, the Nintendo NES, the Atari ST and many, many more greats (and not-so-greats) of the consumer electronics era. We're your Golden Ticket to CES's past, and we're glad to have you along for the tour.

We hope you enjoy your visit!

Another magazine goes on the pile...

When I was a child, I always eagerly looked forward to going to the library – not just for the books (although I was a pretty big science-fiction reader) but for the periodicals. In particular, computer magazines. My family was not well off (but rich in love!) and while my parents worked hard to provide me with a computer, software was a luxury we by and large couldn't afford.

But, at the library, there was a free solution (that didn't involve software piracy!) – those computing magazines commonly published "listings", the source code of applications (termed "programs") that you could type in. It was time consuming, and the typeset listings frequently had errors in them, but that was all part of the "fun" – in order to make the program work, you had to understand the code enough to recognise the bugs and fix them. And so, for want of being able to play a new game, I learned computer programming, eventually.

There was other value to be found in these magazines, too – I learned about hot new technologies (like 16-bit processors!), the idiosyncrasies of other computing platforms, news in the industry, games that I wanted (but couldn't afford, and anxiously awaited type-in clones)...they were never boring (well, maybe the stodgy PC ones). I loved those magazines – *Compute*, *Antic* and *The Rainbow*, among others – and they were a big influence on ours.

In fact, you will notice quite quickly that this magazine makes extensive use of excerpts, quotes, clips, graphics and advertisements previously published in those now-defunct computer, video game (is it video game, videogame or video-game? we'll discuss this later...) and other electronics-related magazines. We do this in order to present engaging, well-rounded content that provides a clear glimpse into the past – we think that's crucial to fostering a contextually-accurate view of electronic history.

Further, we want every page of *Paleotronic Magazine* to delight, and a curated selection of diverse historical artifacts helps us do that. We desire to be, in part, a museum in print, and when you visit, we want you to leave happy.

Some of you will question our right to do this arbitrarily. We will plead fair use – we only use this material to augment new spreads, support articles, create montages and so on and do not republish segments or entire original articles in isolation unless they have a clear educational purpose (such as an annotated BASIC listing or plans for an electronics project.) Even then, we will annotate them ourselves and/or provide context, or some reason why it matters we've placed the material then-and-there, and not just blithely copy without distinction in an effort to fill pages.

However, in all cases we will credit the source and the date of publication. We also use freely-available product photos, promotional materials and previously published pictures of individuals in our effort to create new educationally-oriented works. *Paleotronic Magazine* provides nostalgia and entertainment value for many, to be sure, but ultimately we see ourselves as an educational publication and our point and purpose is to inform, enlighten and encourage skills development, particularly in the fields of electronics engineering, computer programming and design.

In that spirit, we endeavour to provide useful context, trivia, facts and knowledge in each article, to provide learning opportunities for our readers, young and old.

Regarding our own copyright: while we feel printed copies of *Paleotronic* are important, and will continue to charge for digital copies in order to help offset the costs of early print runs, we also recognise that it would be hypocritical of us to attempt to maintain a traditional copyright long-term over something that is largely derivative.

So, we pledge to publish content to our website for public access two months after it is printed, and declare that our copyright on any of our material will expire five years after the date of first publication. We feel that this is fair and provides a balance that we hope the owners of any content we re-purpose will find acceptable.

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JCATALOG

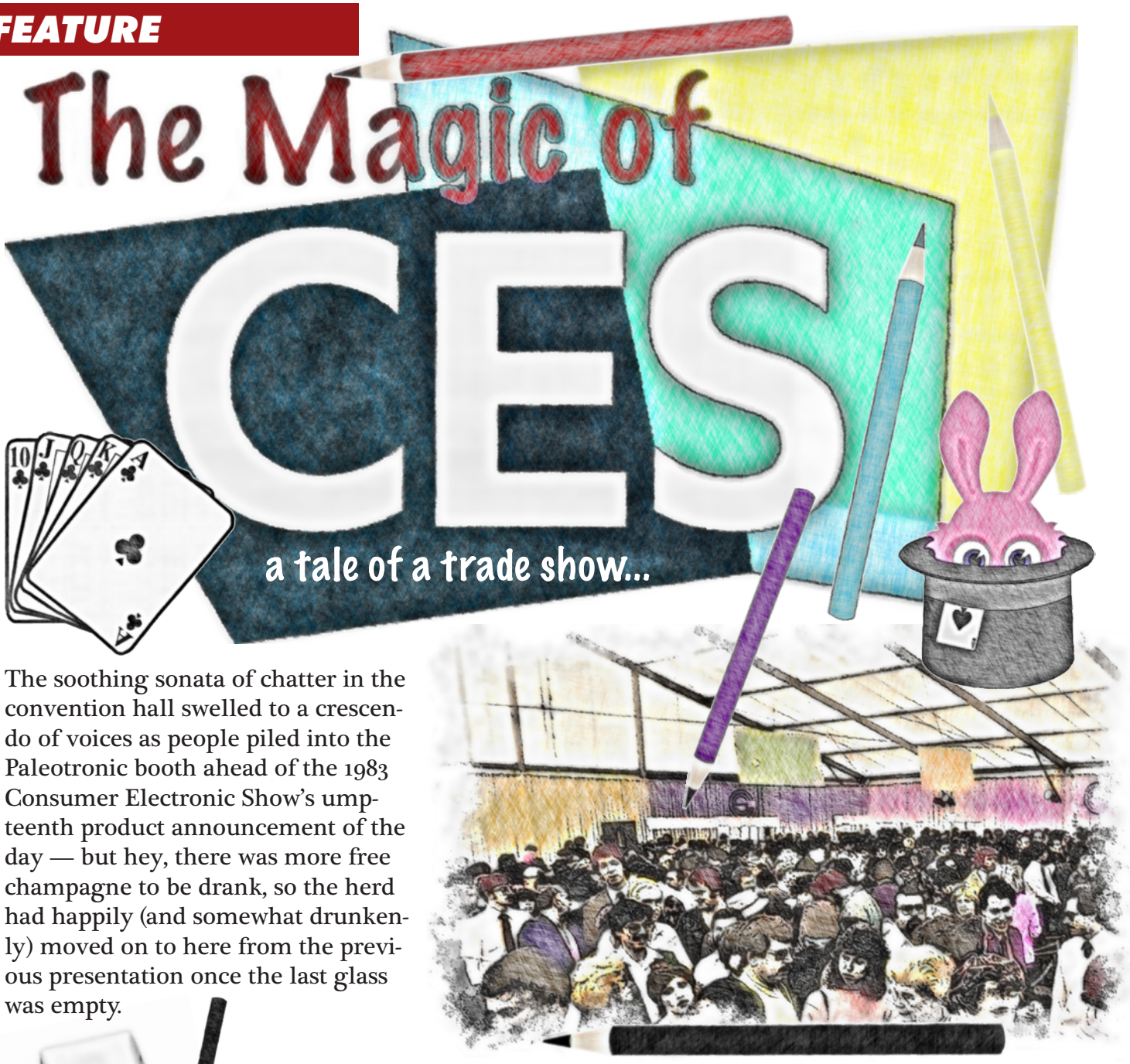
WHAT'S WHERE IN THIS ISSUE

FEATURE PRESENTATION

DEPARTMENTS

The Magic of CES

a tale of a trade show...



The soothing sonata of chatter in the convention hall swelled to a crescendo of voices as people piled into the Paleotronic booth ahead of the 1983 Consumer Electronic Show's umpteenth product announcement of the day — but hey, there was more free champagne to be drank, so the herd had happily (and somewhat drunkenly) moved on to here from the previous presentation once the last glass was empty.

Our story might take a little creative license with the amount of alcohol consumed on the trade show floor, but plenty would be drank at the various private functions held elsewhere...

Besides, some of these were actually interesting; most weren't, but some were, and Jan was just happy to be partying a bit on the company dime, instead of her daily grind of filing purchase orders and returns, browsing an endless sea of supplier catalogues, and gazing into the crystal ball at the bottom of her coffee cup in an attempt to predict what "the next big thing" could be that would ensure the Christmas receipts for the small chain of American electronics retailers she worked for brought them into profit for the year, rather than end it with a loss.

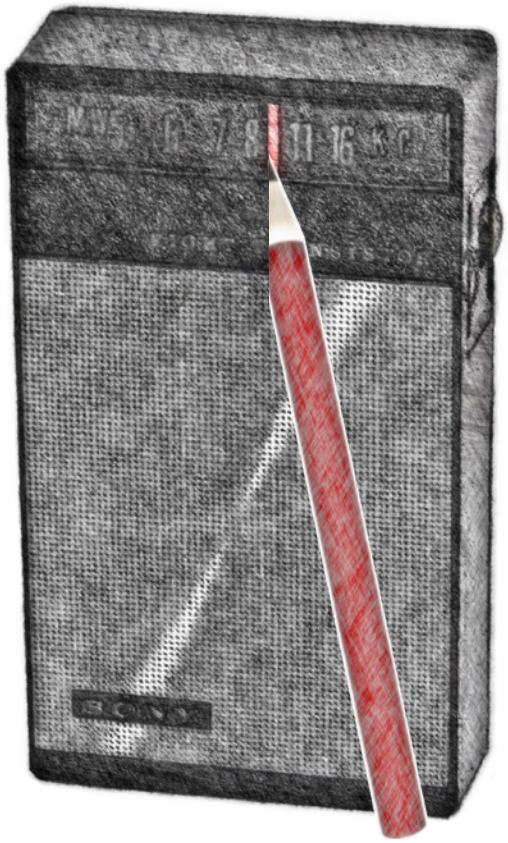
Business was tough; but for now, it was about having a drink with the people she would spend the other 364 small-talking with over the telephone. And maybe someone might show something truly game-changing — but Paleotronic's new "product" probably wasn't it. Their line had typically been filled with cheap knock-offs of desktop calculators and handheld LED sports games, stuff you could fill your discount bins with and make shoppers think they had gotten a deal, while the retailer still made a couple of bucks. Impulse buys and second-chance items, not anything anybody made an effort slogging into a store when it was thirty below to get "before supplies ran out". Penny-ante junk.

However, their champagne was good and there was a lot of it, so it was worth being packed in like cattle and sweating like swine to learn a little about what she probably wouldn't buy, but would applaud and cheer anyway, because free booze. And then they would move on to the next. Maybe Coleco or Atari or Mattel might have a new something to carry the next Christmas day. Who knows? For now, who cares!

Jim from Acme Distributors was droning on in her ear about how they were partnering with a new shipping company, blah blah blah, and Jan was starting to become hypnotised by the combination of background babble and the comforting monotone of Jim's baritone. Does what happens in Vegas *really* stay in Vegas? Jim's moustache and bushy caterpillar-like eyebrows were becoming oddly attractive. Probably the wine, but still, the way they moved as he talked was like some kind of weird ballet of facial hair, and Jan was entranced by it. Wait, where was she again?

"Ladies and gentlemen," a voice shouted over the crowd, at first polite and then repeating his attempt at getting the mob's attention more insistently, and with a growing undertone of irritation. Glasses were clanked, and then the air-horn came out.

That did the job. Jan remembered where she was, and even Jim shut up. The crowd turned to the makeshift podium under the Paleotronic banner and made some effort to look like they were actually listening, even though they probably wouldn't remember a single word of it.



The first Consumer Electronics Show, held in 1967, had pocket radios and solid-state televisions on display.

"Ladies and gentlemen, thank you for attending our presentation! (everyone said that… it's because of the free wine, stupid!) We're so pleased to be able to give you a first look at (a sneak peek of, an exclusive introduction to, the chance to see…) our latest hot (awesome, incredible, amazing) new product. But first, we'd like to briefly remind you of our interesting (boring, meaningless, pointless) corporate history…"

By the early 1980s, everybody who was anybody would have a booth at CES, including Microsoft, Apple, Commodore, Atari, Sony and hundreds more.

For many manufacturers, CES was the only trade show they attended, and if you were a retailer who wanted a head-start in planning your forward business strategy, CES was the place to be.

Like with the rest of Las Vegas, fortunes could be made (and lost) here.

Portable devices were popular at early CES's; previous valve (vacuum tube)-driven devices were large and heavy, and lighter was better.

Jan almost fell asleep on her feet, but Jim steadied her before she toppled completely over, and Jan half-smiled in a "thanks, but don't think this means anything" sort-of way. There was a brief moment of panic when she realised her glass was empty, but Jim grinned and produced a full one with his left hand. "Magic," he mouthed silently, and Jan laughed not-so-silently, getting a stern look from the corporate shill currently espousing what made their company oh-so-much better than any other, which was seriously nothing.

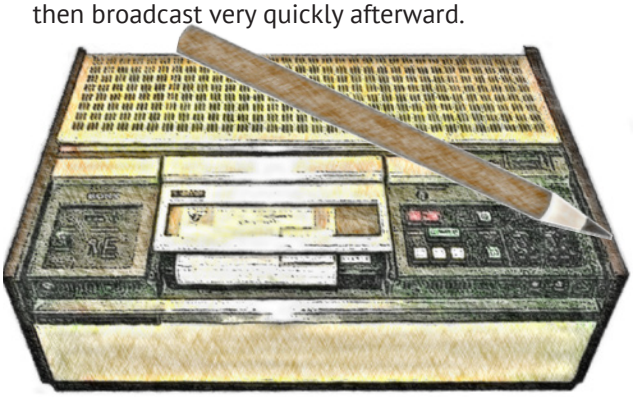
"Nobody cares about your stupid origin story!" Jan wanted to shout, "Just get on with it!" But she didn't, because then she might get kicked out, and then there wouldn't be any more free wine. She was really liking the wine.

"Okay, so enough of that," the presenter said, winding up that segment of his spiel to a few cheeky cheers and applause. "Hey," he grinned, trying to lighten the mood, "this gig pays by the minute!" A few stifled laughs. "Aw, everybody's a critic," — with faux-hurt feelings. The chattering of the crowd started to grow, and he realised he had to stomp on it quickly. "So, the moment you've all been waiting for!"

It was a computer. They called it the "microM8". It had cartridges that allowed it to be compatible with other computers. You could buy a Commodore cartridge, an Atari cartridge, even an Apple cartridge, and then run disk or tape software for whatever computer's cartridge you stuffed into it. It also had a cartridge for Paleotronic's own arcade system, so users could develop games for

Sony's 1970 U-Matic was the first video recorder to put the tape inside of a cassette, unlike the open reel-to-reel machines common at the time.

In 1974 Sony would release a portable model that freed up journalists to record on-site and then broadcast very quickly afterward.



it, and a dedicated on-line service with a downloadable software library via the computer's in-built modem.

It was really something. But it was expensive, and the system cartridges were expensive, and Jan and the rest of the herd had been there to find out about cheap bargain things, not some (likely fruitless) attempt at global home-computer supremacy. The crowd muttered and murmured, rendered their judgment with their ambivalence, and then moved on. And that was that. The microM8 was a flop, to likely be forgotten by the end of the day, like so very many other CES product launches.

But that was the game: you put in your silver dollar (with your product name etched on it) and pulled the handle. And you won or you lost. Paleotronic lost.

Jan and Jim would drink a great deal more wine, and… well, what happens in Vegas stays in Vegas. But Jim's company wouldn't distribute the microM8, and Jan's chain of electronics stores wouldn't stock it. It would be relegated to relative obscurity, carried by a few niche computer stores for a few years before it faded away. If only it

Like the fictional microM8, the Commodore Plus/4 was a pretty serious bomb.

This "portable executive telephone" seen at CES in 1968 would've cost US$14,000 in modern terms. Ouch!

had just been a little cheaper, a little less fancy, a little more… budget. If only.

But we're not here to talk about failures like the (admittedly fictional) microM8 (well, maybe one or two, but you'll have to dig into our departments to find out about those.) No, we're here to talk about the magic of the Consumer Electronics Show, and that magic stems not from its infamous (and not so infamous) flops, but from its successes — both the success of some of the more noteworthy products to be demonstrated there, and the success of the show itself and its enduring nature.

Cue a bit of corporate shill-styled historical minutia:

(Jan would probably sip her glass of wine and glance lazily over this next bit, but if you could stay with me, that would be great! I get paid by the word…)

Held in June 1967 in New York City, the first Consumer Electronics Show was actually a spinoff from the Chicago Music Show, where the emerging electronics industry had previously been showcased. Attendees got to see the latest pocket radios, and the first televisions with integrated circuits (known as "solid state", meaning that they used solid semiconductors instead of valves AKA vacuum tubes, as they had earlier.)

The show was popular, and it went on the following year, with radios the size of wristwatches and the first portable "executive" telephones, which were weighty both in price and, well, weight, at more than US$2000 1968 dollars (US$14,000 in 2018) and almost 9 kilograms (19 pounds). Talk about heavy conversation!

Chicago was cold; Las Vegas was warm. No brainer!

1970 saw the first VCR (see the Entertainment Centre on page 13 for more on that), and in 1972 the show moved to Chicago. But the pace of the consumer electronics industry was increasing, and in 1973 organisers opted for two shows, summer and winter. But who wants to hang around Chicago in the middle of winter?

In 1978 the winter CES was held in Las Vegas, a much more hospitable and attractive place to be in January, and that schedule would hold

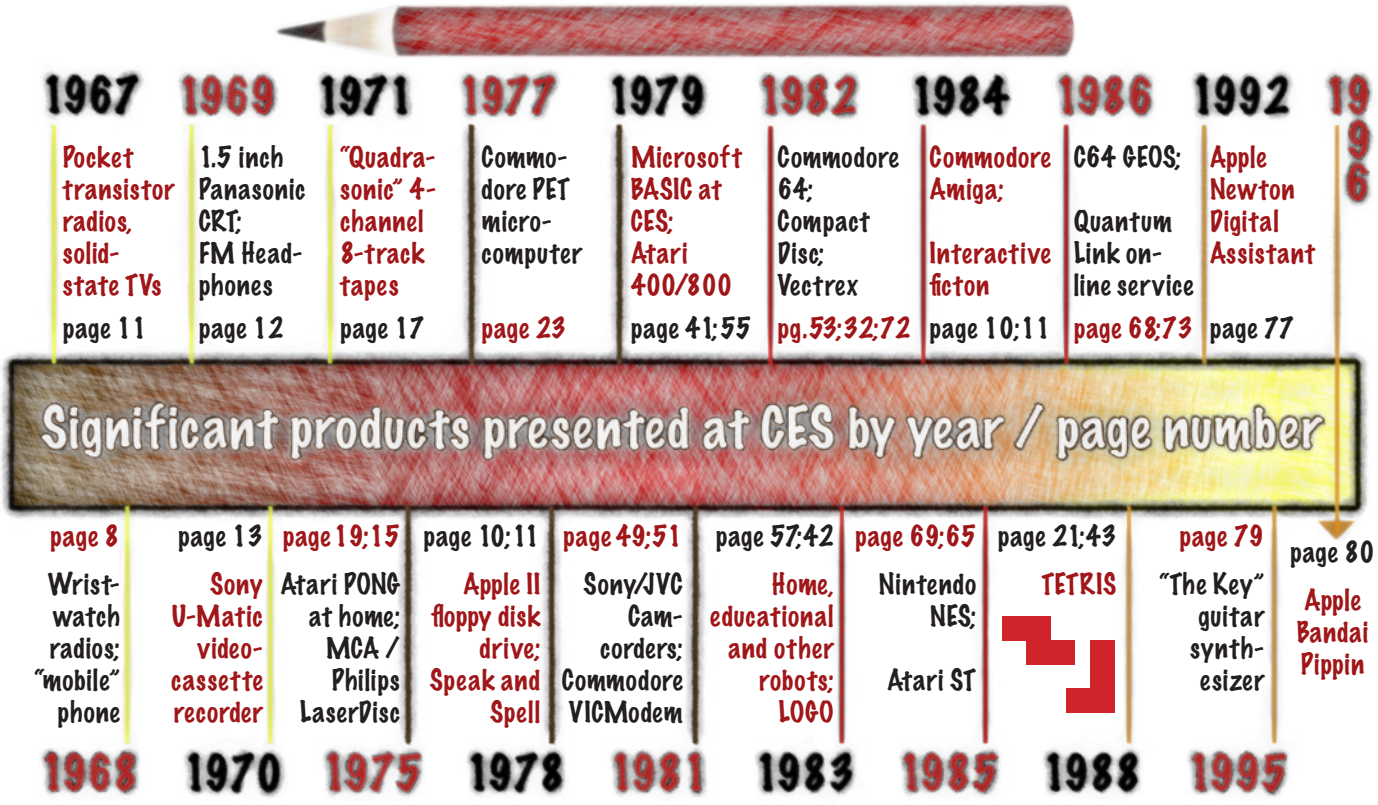
until 1995, when organisers decided to start moving the summer show around due to Chicago's waning popularity — with mixed success, eventually cancelling it in 1998. But the Vegas show would remain, and run every year to the present (and presumably far beyond, since today it is one of the top two biggest shows in the Nevada-desert mecca, its rival focussed on the construction industry.)

And with that, we end our brief look at the history of the Consumer Electronics Show itself (after all, who wants to talk about the wrapping when we're all wondering about the gift inside?) But rather than continue this (already long) article with a summary of the various hits and misses the show has seen (as you might expect), what we've decided to do instead is dedicate this issue's various departments to CES debuts that are relevant to their area of interest, and leave the details (and available pages) to them.

For example, Arcade Rats (page 19) will be looking back at Atari's Pong (the home version of which was demonstrated at 1975's CES) and Tetris (first shown in 1988). Our 8-bit computing department Loading Ready Run (page 53) will examine the premieres of the Commodore 64 (1982) and the Atari 800 (1979). And so forth.

There are so many departments, and so much ground to cover, so let's leave Jan in 1983 to recover from her well-earned hangover (maybe with Jim? who knows…) and continue with our celebration of the Consumer Electronics Show, and the bounty it has brought to our lounge rooms, bedrooms, classrooms and beyond.

As for me, I'm off upstairs. They're saying Compaq is having a party to rival the ages. There's a cowgirl riding a mechanical bull! Should be awesome…



Consumer electronics today represents a $32 billion industry. *The* place to see what's hot and what's not in the consumer electronics business is the semi-annual Consumer Electronics Show (CES).

A.N.A.L.O.G. Computing, October 1988

COMMODORE ANNOUNCES TWO NEW COMPUTERS AT CONSUMER ELECTRONICS

WHAT'S NEW at CES

by Arthur Leyenberger

At every Consumer Electronics Show there seems to be, if not a stated theme, at least a common denominator that reappears in booths all over the show floor.

At the most recent CES in Las Vegas it was arcade games. Some manufacturers, like Commodore and Coleco, had full size games in their booths to promote hand held or computer versions. Others–Atari, Mattel and Activision–had their own versions running on their own machines. All of them drew crowds.

In fact, it seems that these manufacturers have finally found something to rival the pornographic video tapes that have been the crowd pleasers for the past several years. And what better way to get a person hooked than to offer him a few free rounds of whatever game it is you are selling?

Creative Computing, May 1982

Report From The Winter Consumer Electronics Show

What exactly is the CES, you may ask, and why is it held? The show is open only to the industry, not the general public. In theory, it is the marketplace where manufacturers (or importers) display their wares to the retailers. Buying and selling, making deals, opening new dealers, finding new lines to carry, introducing new products — all are the order of the day in this orgy of free market capitalism. Anything you will buy at Christmas was likely displayed at the CES, where deals between manufacturer and retailer were clinched. Needless to say, much wining and dining usually accompanies this high-level wheeling and dealing, and Chicago is the perfect place to do it in style.

Along with this, everyone looks up friends and exchanges all the latest gossip on which company is doing what, which company is on the skids or making money so fast they can't count it. The CES is a "slave market" for salesmen at every level — from the lowliest car stereo installer to the loftiest corporate marketing expert. If you want to be in a place where human energy is being expended at a breathtaking rate, the CES is for you.

SoftSide, August 1983

CES VEGAS

GAME COMPANIES PREPARE FOR ALL-OUT WAR AT THE WINTER CES

The Consumer Electronics Show was widely covered in the 1980s and 1990s by computer and gaming magazines, and still is.

SMALLER IS BETTER

Lee De Forest's 1907 Audion vacuum tube is widely credited with kickstarting the modern electronics industry in general, but it would take the much smaller, lower-power and cooler transistor to shift it into high gear.

German physicist Julius Edgar Lilienfeld filed patents in the US and Canada for a field-effect transistor during the 1920s, which was intended to be a solid-state replacement for the power-hungry, fragile thermonic triode vaccum tube (see sidebar). It was (and is) able to both act as an electronic logic gate (used in modern computer circuitry) using a two-terminal electron "channel" (with a "source" and a "drain", and a one-terminal "gate"), and as an amplifier, able to build up the strength of a signal by using current to narrow the channel at one end; however, the materials necessary to make his invention practical would not exist for another twenty years.

The thermonic triode, a vacuum tube similar to the one pictured, works by using heat to modify the conductive properties of a filament.

In 1880, Thomas Edison discovered that, when a parallel current was applied to the filament circuit, the charge in the hot filament could be amplified, or cut off. Edison used his "thermonic diode" to power the first telegraph stations.

The triode added a charged grid that could modify the current.

In 1947 John Bardeen and Walter Brattain, scientists at AT&T's Bell Labs in Murray Hill, New Jersey who were researching the conductive properties of materials, observed that when two gold terminals were applied to a crystal of germanium (a semiconductor – that is, an element whose qualities

During the late 1970s and early 1980s, Radio Shack, a well-known retailer of electronic devices and components, published a series of comic books that taught kids about the science of electronics and its history.

of conductivity – or ability to carry electric current – can be modified by adding impurities to, for example, increase resistance in a particular direction), an output signal was produced with greater power than the input –an amplifier.

Solid State Physics Group leader William Shockley saw the potential in this, and over the next few months worked to greatly expand the knowledge of semiconductors. Shockley initially wanted to patent a field-effect transistor, but having unearthed Lilienfeld's patents, Bell Labs' lawyers advised against it. Instead, what Bardeen, Brattain, and Shockley invented in 1947 was the first point-contact transistor, for which they would win the Nobel Prize.

Previously powered by vacuum tubes, the introduction of transistors to consumer devices in the 1960s greatly reduced their weight and size, and miniaturised devices were popular at early CESs.

The device consisted of two terminals (an "emitter" and a "collector") mounted on a triangle of plastic, each contacting a layer of germanium, itself layered on a base of metal. When a small current was applied to the emitter, the current flowing from the emitter to the base was increased by a greater amount, thus acting as an amplifier. It was soon superseded by an improved version, called a bipolar junction transistor, which, in part, reversed the flow from the base to the collector, and is how transistors function today. Germanium has also since been replaced by silicon and other alloys.

Over time, the transistor became smaller and smaller – there are billions in a modern computer microprocessor!

Tiny CRTs

The cathode-ray tube (or CRT) used in older televisions is a vacuum tube that contains one or more electron guns and a phosphorescent screen that converts these streams of electrons into light.

In television sets, an electromagnetic field is used to bend the electron streams, forcing them to scan across the screen in horizontal lines in a vertical pattern called a "raster".

At CES in 1969 Panasonic introduced a 1.5 inch (38mm) CRT. "What could such a tiny thing be good for?" you may ask. Well, initially used in oscilloscopes, it would eventually be used in Sony's "Watchman" portable television sets in the early 1980s, and as viewfinders in video cameras up until the early 21st century.

Although they may seem primitive in today's world of LCD and LED displays, the abilities granted by these tiny CRTs – to produce smaller electronics diagnostic equipment, watch television anywhere, and to record video confident in the look of the final product – contributed to an ongoing trend toward miniaturisation that led us to live in the mobile world we have today.

This 1933 radio would have been a little hard to take to the beach, but its much smaller transistorised cousin (to its lower left) is perfectly suited to bringing a little music to the great outdoors.

Radio Waves

over-the air transmissions

The Home Entertainment Centre

SONY
NEWS/LETTER

VOL. 5 NO. 28 — Published by Sony Corporation of America — WINTER, 1970

Exciting the world!...

SONY DEMONSTRATES COLOR VIDEOPLAYER

COLOR VIDEOPLAYER

The Sony Color Videoplayer is connected to standard color TV and Hi-Fi stereo components. Easily and instantly, one can enjoy programs on a TV screen, with high-fidelity sound from the speaker.

PRESS AND V.I.P. ATTEND SHOWING IN NEW YORK

Sony demonstrated its new Color Videoplayer recently at the Hotel Pierre in New York City. More than 150 press representatives attended one session, while about 300 VIP's, from the motion picture, publishing, music, television, sports and electronic industries were on hand for a second demonstration.

The Color Videoplayer is considered the next home entertainment product that will win wide acceptance. Sony believes the Videoplayer is the most practical, economical and reliable system yet to be introduced.

The Color Videoplayer utilizes a magnetic video tape recording method and a cassette tape, called a Videocassette. Each Videocassette can provide a program up to 90 minutes.

The Videoplayer can be connected to any standard color TV set, without any modifications in the set, to immediately reproduce a color picture on the screen, with sound. Fully compatible, the Videoplayer may be used with a black and white TV set.

In the future, when many consumers have Color Videoplayers in their homes, an extensive library of programs will be available.

All representatives from the entertainment industry, who attended the demonstration, agreed that Sony has developed

OCTOBER SALES WELL OVER $10 MILLION

You read about Sony Corporation of America setting a sales record for any month in its history—with over $10 million sales being recorded in October.

But the truth is that sales were well over this announced figure—closer to $13 million!

Desk Top Unit!

NEW ELECTRONIC CALCULATOR IS SHOWN

The press and buyers turned out to see the new Sony ICC-2500 desk-top electronic programable calculator with 111 instruction capabilities and external cassette program storage at the New York Hilton

The Cassette Comes to Video

The audio cassette, developed by electronics manufacturer Philips in Belgium and released in 1963, was originally developed for use in dictation machines. As fidelity improved, it would eventually replace 8-track tapes (see Pop Culture) in the late 1970s, but Sony wondered if there was another potential use for the cassette format in the videotape market. However, unlike an audio cassette, the reels in Sony's implementation turn opposite directions to each other. This is to ensure the videotape remains tight during playback, to avoid glitching. "U-Matic" (as Sony called their format) also featured a rudimentary form of write protection, by means of a sticker affixed over a hole in the bottom of the videocassette.

It was originally Sony's intention to market U-Matic recorders towards the consumer to record and store live television broadcasts, but the high cost of the machines and the cassettes made the retail price extremely unattractive to casual users. However, U-Matic was popular amongst businesses (which used it to communicate between business units and to clients and customers,) and educational companies, who produced videocassettes for use by schools.

U-Matic also found popularity in the broadcast sector, which had struggled previously to deliver up-to-date news broadcasts using 16mm film, which required time to develop. After Sony's introduction of a

portable U-Matic recorder in 1974, the news industry quickly took up the format, which allowed them to record and broadcast footage as quickly as they could get it back to the studio. This ushered in the modern era of Electronic News Gathering (or ENG).

The introduction of a "higher bandwidth" U-Matic format in the early 1980s was the final nail in the coffin of the use of 16mm film for news. Its improved colour quality and reduced noise removed any advantage that remained in film.

Further, the eventual introduction of remote microwave and satellite transmitters further increased the potential immediacy of news coverage to instant, something impossible with film.

While U-Matic would eventually be replaced by Sony Betacam (see The Pro Shop) it became a standard in professional video for many years, and was an important precursor to subsequent videotape formats such as Betamax and VHS, the price of which, unlike U-Matic, would eventually come down and finally popularise the ownership and use of home videocassette recorders in the 1980s.

Let's start with the video tape. First out of the gate in the financial sweepstakes was Sony with its ¾-inch U-Matic helical-scan system. Almost at once, many of the large industrial firms hopped onto the bandwagon and began setting up internal hookups for training, educational applications, recording and sending material from one office to another. So far, the prime targets have been industry and educational institutions. (Next, the home consumers.) The conventional helical-scan process is used, with two heads on a rotating drum.

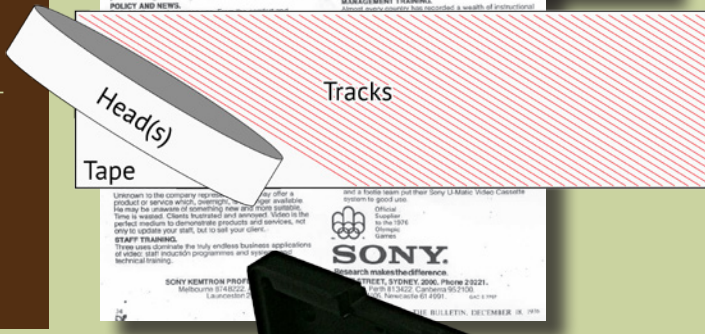
Although there has been no agreement on any standards for video tape systems, it seems that other major manufacturers have followed suit and are making machines compatible with the Sony. JVC Nivico, Matsushita, Panasonic, and Concord are some of the names familiar to everyone which are associated with ¾-inch machines similar to Sony. Modifications have been made so no two are identical, but the operation is similar and the sound, video, and sync signals are compatible between the machines.

db March 1973

How does videotape work?

Unlike audio cassettes, which store a single signal recorded and played back using one stationary magnetic "head", analogue videotape uses a moving cylindrical "drum" which records signals using a method called "helical scan".

Audio tape moves at a constant speed and provides limited "bandwidth", or frequency resolution. To record video, such a system would need an immense amount of tape moving at high speed, which is impractical. Instead, helical scan rotates a drum containing one or more heads while the tape moves over it at an angle. This causes the signal to be imprinted using diagonal stripes, and uses much less overall length of tape than linear methods.



Pioneer videodisc system now more widely available

Radio Electronics January 1981

Pioneer made its new LaserDisc videodisc system available through more than 400 retail outlets in 46 U.S. cities in October. That laser optical videodisc system consists of prerecorded discs and a player that can be connected to any standard TV set. A low-power laser reads audio and video information from the disc and transmits the picture and sound to the TV set. The audio may also be fed to a stereo-sound system.

The discs, which resemble mirrored LP records without grooves, never wear out because no needle or stylus is used. They are recorded on both sides. Playing time is 30 or 60 minutes per side, depending on the mode of operation. Each disc contains up to 108,000 individual frames—enough for the entire Encyclopedia Britannica. Suggested retail price for the LaserDisc system is $749, and videodiscs range from $5.95 to $24.95.

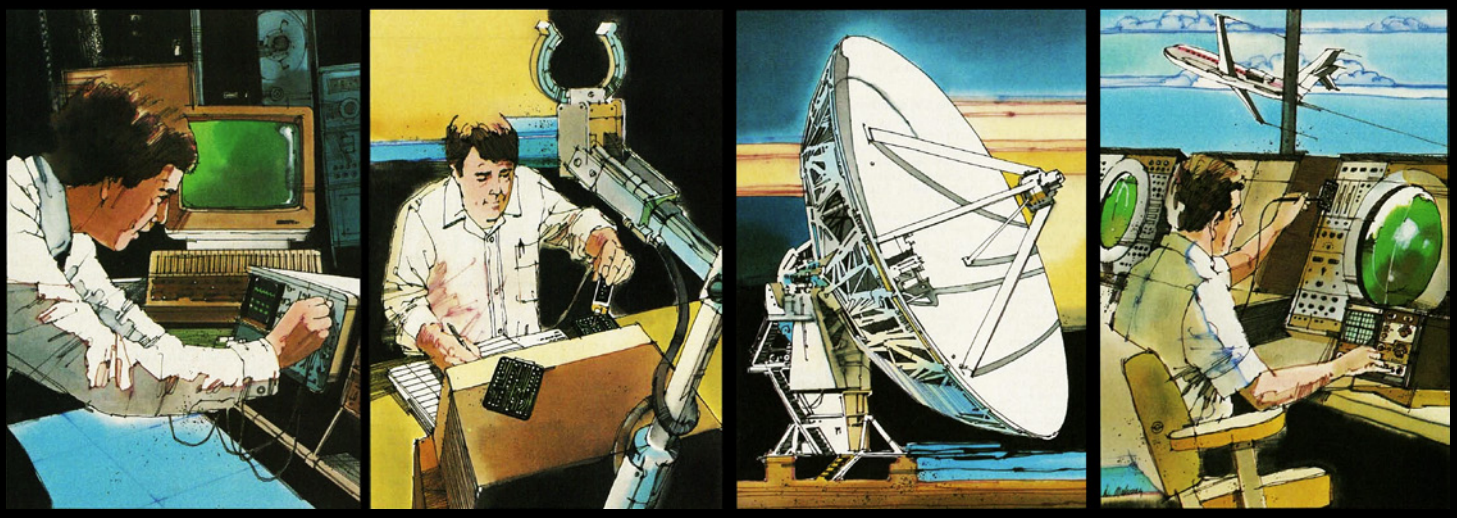
The LaserDisc, first demonstrated at CES in 1974, was the product of a partnership between MCA (Music Corporation of America, which would takeover and then become Universal Studios) and Dutch company Philips. MCA had purchased a 1961 patent for a video system using a transparent disc, but Philips had developed a similar system using a reflective 12 inch (30cm) disc, and the two companies decided to combine their efforts.

Like with CDs (see The Archivist for more), a laser is used to read "pits" carved into the disc. However, instead of digital (binary) information, the varied lengths of the pits (and not-pits or "lands") are used to reconstruct analog audio and video signals.

Because there was no physical contact with the disc itself, quality never suffered due to multiple plays, unlike videotape. You could also skip to anywhere on the disc instantly. Further, LaserDisc featured stereo sound, and supported multiple language tracks. However, the discs were not "kid friendly" and required flipping halfway through most movies. Players also couldn't record. While popular in Asia, LaserDisc lost out to VCRs elsewhere.

At the summer 1983 CES, videotex-terminal manufacturer Quazon introduced a low-cost device that allowed users to connect to information services such as Compuserve and Dow Jones using their home television set.

Videotex allowed users to receive a small subset of features available on on-line services such as real-time news, weather and stock market information (things which we take for granted today.)



This is Bob. Bob knows electronics. Bob can do all sorts of amazing stuff! Be like Bob. Get *Paleotronic*.

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POPPED

You're cruising along in your brand-new 1968 Ford Fairlaine, and you want to listen to some tunes. What can you do?

Well, listening to vinyl was largely out. While some in-car record players did exist, they weren't very practical while you were moving! The quality of cassette was not good yet, and reel-to-reel tape was too bulky and cumbersome for the car. FM radio wasn't common yet either!

Luckily, you have 8-track. Initially developed for use in radio stations, the single-reel, four-track Fidelipac cartridge format was later refined for use in automobiles, adding two additional programs each using two tracks, for a total of eight, which allowed for around 80 minutes of playback. Plenty of time to cruise around before you have to change the tape! The playback head would automatically shift to the next two tracks at the end of each "program" too, and because the tape looped back on itself, you could just listen to the same cartridge over and over, if you wanted to. Problem solved!

Thing is, you couldn't fast-forward or rewind. Or skip to your favourite song. It was like your own personal radio station, in both good ways and bad. Also, the player would sometimes "eat" the tape! The play head could misalign and you'd here a cacophony of two songs at the same time! Augh! Despite these shortcomings, 8-track would survive until the late 1970s, when the quality of cassettes improved enough to replace them. However, 8-track had one more trick left up its sleeve that cassette could never match.

At the 1971 CES, Quadraphonic 8-track was introduced. Instead of four programs there were two, but they each had four channels of sound (two to the front and two to the rear). Most "quadraphonic" cartridges added little value to the experience, but Isao Tomita's 1976 "Firebird" was a notable exception. The electronic music pioneer's rendition of Igor Stravinsky's "The Firebird" is particularly groovy, and at its purest on 8-track – vinyl quad "encoded" the extra channels: less groovy.

CULTURE

Mamma mia! At 1993's CES, Nintendo premiered the trailer for their upcoming Super Mario Bros. movie, in which two Brooklyn plumbers are swept into another dimension where they must do battle with villains from the video game, rescue the Princess, and prevent King Koopa from taking over our world. Sound good?

Problem: The movie really sucked!

The studio Nintendo sold the rights to took serious liberalities with the storyline. Instead of the Mushroom Kingdom, there was now Koopa City (complete with cars) in the middle of a desert. The husband-and-wife directing team was reportedly incompetent. The actors took up drinking!

Dennis Hopper (who played Koopa) joked: "my six-year-old son at the time - he's now 18 - he said, 'Dad, I think you're probably a pretty good actor, but why did you play that terrible guy King Koopa in Super Mario Bros.?' and I said, 'Well Henry, I did that so you could have shoes,' and he said, 'Dad, I don't need shoes that badly.'" Enough said.

Sony's Walkman debuted in 1979, but 1981's CES saw its monopoly over portable cassette players come to an end.

Sony co-founder Masaru Ibuka liked to listen to opera on long flights, but found existing stereo portable cassette solutions too cumbersome. He wanted something lightweight with good battery life, and directed his company to develop a new product. They succeeded, and dubbed it the "Walkman".

Despite its high price ($150 1981 dollars – close to $500 today) the Walkman sold well, but it was inevitable that competitors were going to "knock it off". Rival manufacturers Sanyo and Craig would introduce their own versions, but with a lower price ($99 MSRP, but often sold for less) and others would soon follow.

AT CES

Sanyo And Craig Show New Players

NEW YORK—The 1981 Winter Consumer Electronics Show in Las Vegas will be the kickoff of the "Walkman wars." Two electronics firms, Craig and Sanyo, will introduce Walkman-like units at the $100 price point, and more companies may follow suit.

The portable stereo cassette player is one of the hottest new products on the consumer electronics scene. Sony's Walkman, the first such player to be marketed in the U.S., is being discounted to as low as $150 in stores here. The unit lists for $199.

The Craig player, dubbed Soundalong, which carries a suggested retail price of $99.99, includes such features as built-in condenser mic, automatic built-in battery charger, tone control, dual volume controls, and a strap-on carrying case for three cassettes. The price includes lightweight headphones, and an extra pair sells for a suggested $24.99.

Sanyo will introduce two models of its Sportster cassette player, at $200 and $99.95 suggested retail. The top model features Sanyo's AMSS music search system which automatically locates the beginning of each cut, in addition to several other features.

ARCADE

Allan Alcorn's PONG (designed by Nolan Bushnell, himself inspired by Ralph Baer's Odyssey) was a smash hit for Atari; its 1972 release quickly became the first commercially successful video arcade game, and it wasn't long before there was a demand for a home version. Atari developed a PONG console during 1974, but had difficulty finding retailers interested in selling it, who felt it was too expensive and had limited novelty for the price.

Despite receiving interest from US department store chain Sears, which had sold the Odyssey through its sporting department and wanted to do the same with PONG, executives insisted the game would sell better through toy stores, and demonstrated it at a number of trade shows (including CES) in 1975. But Atari failed to woo any other partners, and eventually made a deal with Sears, which sold the PONG consoles under the name "Sears Tele-Games." They sold 150,000 units over the Christmas season.

It didn't take long for Magnavox, maker of the Odyssey, to sue Atari – Baer had kept notes describing an electronic ping-pong game all the way back to 1966, so it was open-and shut. Atari

RATS

settled for US$700,000 and offered to share the rights to any of its new products with Magnavox for a year. (Atari, of course, simply didn't release anything new during that time.)

Meanwhile, PONG clones were appearing everywhere. For some notable video game manufacturers, including Nintendo and Coleco, PONG variants were their first entry into the home video game market. Magnavox also re-released the Odyssey.

To keep up demand, new versions with additional variations on the core PONG mechanics, such as squash or volleyball, were progressively released. Units with colour appeared. The home video-game market became well established, and would roll on with increasing frenzy until the 1983 video game crash.

Video games: Put your backhand on TV

by Cindy Morgan

PM photos: Benn Mitchell

How can you play tennis or hockey without working up a sweat? Go racing without accidents or traffic tickets? Shoot targets in your living room without nicking the plaster? With a video game, that's how. Plugged into your TV set, it lets you play a variety of games without leaving your chair.

Video games don't build your muscles, but they do challenge your reflexes. Moving an on-screen "paddle" to volley back an on-screen "ball" may seem easy—but wait till you try it.

And once you've gotten the hang

Doubles tennis for two on Magnavox's Odyssey 200.

Video games don't build your muscles, but they do challenge your reflexes. Moving an on-screen "paddle" to volley back an on-screen "ball" may seem easy—but wait till you try it.

Popular Mechanics, October 1976

TETRIS®

A Russian work of art!

Tetris by Spectrum HoloByte

Tetris

Tetris is the first entertainment software from the Soviet Union to be marketed in the West, and it's been a tremendous success story in all machine formats. In *Tetris*, the player attempts to manipulate objects of various shapes and sizes as they fall so that they land in a solid pattern. Sound easy? It's not. Sound like fun? It is—and it's thoroughly addictive.

Compute's Gazette, December 1988

Alexey Pajitnov's Tetris – early unauthorised versions of which, such as Spectrum Holobyte's rendition described above, began appearing on home computers in 1987 – spawned a whole new generation of shape-based puzzle games. Holobyte's version took next year's CES by a storm, and garnered the attention of the Soviet government, who held the rights to the game. They sold the arcade rights to Atari and the console rights to Nintendo.

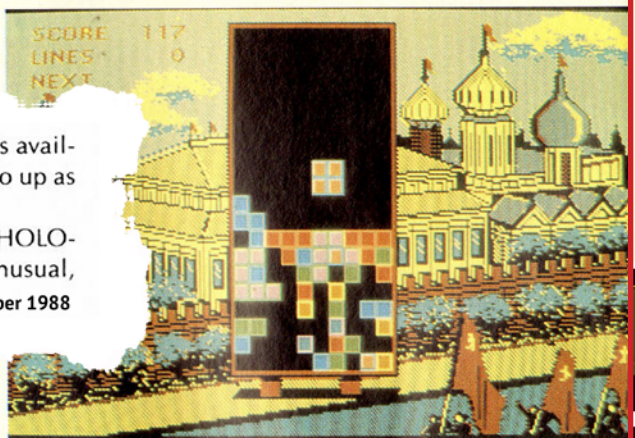
Piece Things Together Soviet Style

By Dr. Michael W. Ecker

Question: What comes from the USSR, is available in the USA, and makes your score go up as the pieces fall down?

The answer is **TETRIS,** SPECTRUM HOLOBYTE'S highly ballyhooed, but surely unusual, new program.

Computer Play, November 1988



...You pre... ...d at which the objects come down, one at a time, with the ability to rotate or translate their motion even as they are falling. In this way, you can move each falling piece, manipulating it to land at places closer to the bottom of the screen that are momentarily unoccupied.

The more total area occupied, the higher the score. Even by itself, the static problem of filling up a rectangle with pieces is a challenge involving a mathematical sense, or at least a good feel for spatial relations. Maybe it's plain old intuitive insight. Whatever it's called, however, the added dimension of motion makes this a dynamic recreation that is even more challenging.

Surprisingly, however, the game takes literally

of the program are included depending on your choice of monitor. For instance, you load ETETRIS for the EGA version. There is also a special RAM-resident version, RTETRIS. This version may be popped up at any time while doing work, such as word processing. The memory-resident version, however, is only for CGA and possibly for monochrome; it doesn't support EGA except perhaps emulating CGA.

The program also contains the now-popular "BOSS" feature: If you are playing the game in

The game also supports keyboard use, thoug... I seldom recommend this. There is a tiny manua... — "booklet" is a more accurate term — of ... pages, with the packaging the kind typical ... games today.

Though **TETRIS** is unique and the promotiona... blurbs speak of the program as addictive, I di... not find myself feeling too compelled to play... However, this doesn't mean that you won't fe... compelled to play. This kind of game is the kin...

SCORE

3780

In 1996 Tetris creator Alexy Pajitnov regained the rights to the game from the Russian government, and he licensed those rights to The Tetris Company, who administers them to this day. The company has sued a number of websites and mobile app developers who developed Tetris-like games. We've published an Apple II BASIC version of Tetris in this issue, but we're hoping to avoid TTC's wrath. After all, you have to type it in in order to play it!

LEVEL 3

LINES 32

What do Steve Wozniak and George H.W. Bush have in common? They've both been seriously into Tetris! But who can blame them? The object of the game (as if you didn't know) is to complete horizontal lines using falling shapes of various configurations. When you finish a line, it disappears, causing the rest of the blocks to fall down a line. However, if you stack up shapes to the point they overflow the top of the playfield: Game Over. When you finish a certain number of lines, the level ends... and in the next, the shapes fall faster, and you need to complete more lines! The insanity never ends.

In an era where games were becoming increasingly more complex, the simplicity of Tetris was seen as a breath of fresh air. Tetris would inspire a number of other "falling block puzzle games" such as Sega's colour-matching Columns, and the three-dimensional Welltris. But Tetris would always remain king (tsar?) of the arcade puzzle game world, with sequels, clones and variations being released for virtually every console, computer, and operating system worldwide.

Nintendo released Tetris on both its Nintendo Entertainment System and on the Game Boy, the latter as a pack-in with the portable console. The inclusion of Tetris arguably made the Game Boy a success – the game was perfect for smaller screen sizes, and was very addictive, spawning a whole generation of Tetris 'junkies'.

Nintendo's version of Tetris for the NES was criticised for not having a two-player mode; however, Atari Games, perhaps mistakenly believing their arcade licensing gave them the right to release a console version, came out with their own Nintendo Tetris game through their Tengen subsidiary (created after the consumer rights to the Atari name were sold to Jack Tramiel, see Point & Click) which featured head-to-head play.

Nintendo sued, and Tengen was eventually forced to withdraw its cartridge from sale, after selling around 100,000 copies. They are collectibles.

Nintendo's Tetris (above) only supported one player at a time, while Tengen's (left) offered head-to-head competition.

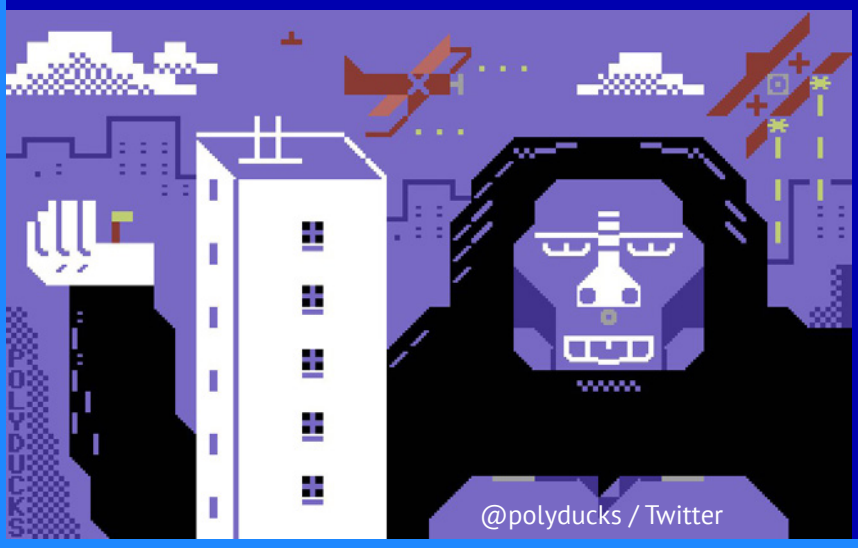
The ART Scene

ANSI, ASCII and Pixel Art

The PETSCII Files

By Rowan Lipkovits

While the Commodore PET was the first home computer with graphical characters, later machines such as the Atari 400/800 and the Sinclair ZX81 also had them, as well as Commodore's later models. It didn't take long for people to realise they could make static art images out of them, and even "movies" that were character-by-character recordings of artists manipulating the text-screen "canvas" to create rudimentary animation. Several parodies of classic movies were produced, including notable B-movies like King Kong.



Any computer that was going to use a command line interface desperately needed a character set, and despite their ultimate monstrous graphical capabilities, Commodore's machines were no exception.

As was usually the case (cf. SHARPSCII, ATASCII) they adopted a flavour of the venerable ASCII character set standard (oddly choosing this time around a 1963 version rather than the updated 1967 revision most other platforms ran with) and added a few tweaks particular to their anticipated needs – much as Intellivision baked a set of "running man" sprites into ROM for general use by its developers, Commodore's instructions for the PET designer Chuck Peddle and the son of its CEO Leonard Tramiel were to include shapes for card suits so as to facilitate easy BASIC production of conversions of card-based parlour games.

But even after this spec was fulfilled, they still had a few extra spots left open in the character set (especially in its unshifted mode), and opted for reasons unknown to enrich it with a wealth of line-drawing characters and a handful of various shaded and unshaded boxes and fragments broken up at 90 and 45 degree angles, which yielded fertile ground down the line for such textmode artists as would opt not to take advantage of the C64's renowned simplified hardware sprite-handling, instead drawing pictures using not vectors or bitmaps, but mosaic-like pointillism using individual fixed-width textmode characters as picture elements.

But not for a while yet. The character set debuted on the Commodore PET in 1977 (hence the label; lacking an official title, it has also been described variously as CBM ASCII or PETASCII) where it could be put to work in glorious green monochrome, but it was not until four years down the line when it was inherited by the VIC-20 (with the same characters but a slightly altered

The Commodore PET 2001, demonstrated at the Winter Consumer Electronics Show in 1977 and released later that year, was the first computer to feature an extended graphical character set. It needed it – it was the only graphics the PET had, not possessing any dedicated graphics modes. But that didn't stop programmers from writing clones of Space Invaders and Lunar Lander only using graphics characters!

aspect ratio to account for a different quantity of columns per screen) that you could finally set those wonderful characters alight in glorious colour! That machine was a respectable splash, followed shortly by its successor the Commodore 64 busting down the door over the next couple of years and introducing the PETSCII text mode to well over ten million users. (This achievement just about wound up the wild ride for the PETSCII standard, petering out with the C128 machine but not making the leap to Commodore's later Amiga line... But disregarding the C64's long lifespan on top of the heap, it continued to live on in the hearts and nostalgic memories of a generation of breadbox enthusiasts.)

Beyond its use in textmode BASIC programs run locally (got any twos? Go fish!) and floppy diskette file listing art, PETSCII found use on C64 bulletin board services, enhancing welcome splash screens, menus and interface elements (and even providing the backbone of primitive animations, chunky cartoons you could watch through your modem!) but failed to catch on quite like the PC's later analogues of ANSI art and ANSImation due to the relatively slow transfer speeds (a leisurely 1200 baud for all but the most daredevil test-pilot users) of consumer-level modems during the Commodore 64's period of market dominance in the home computer market.

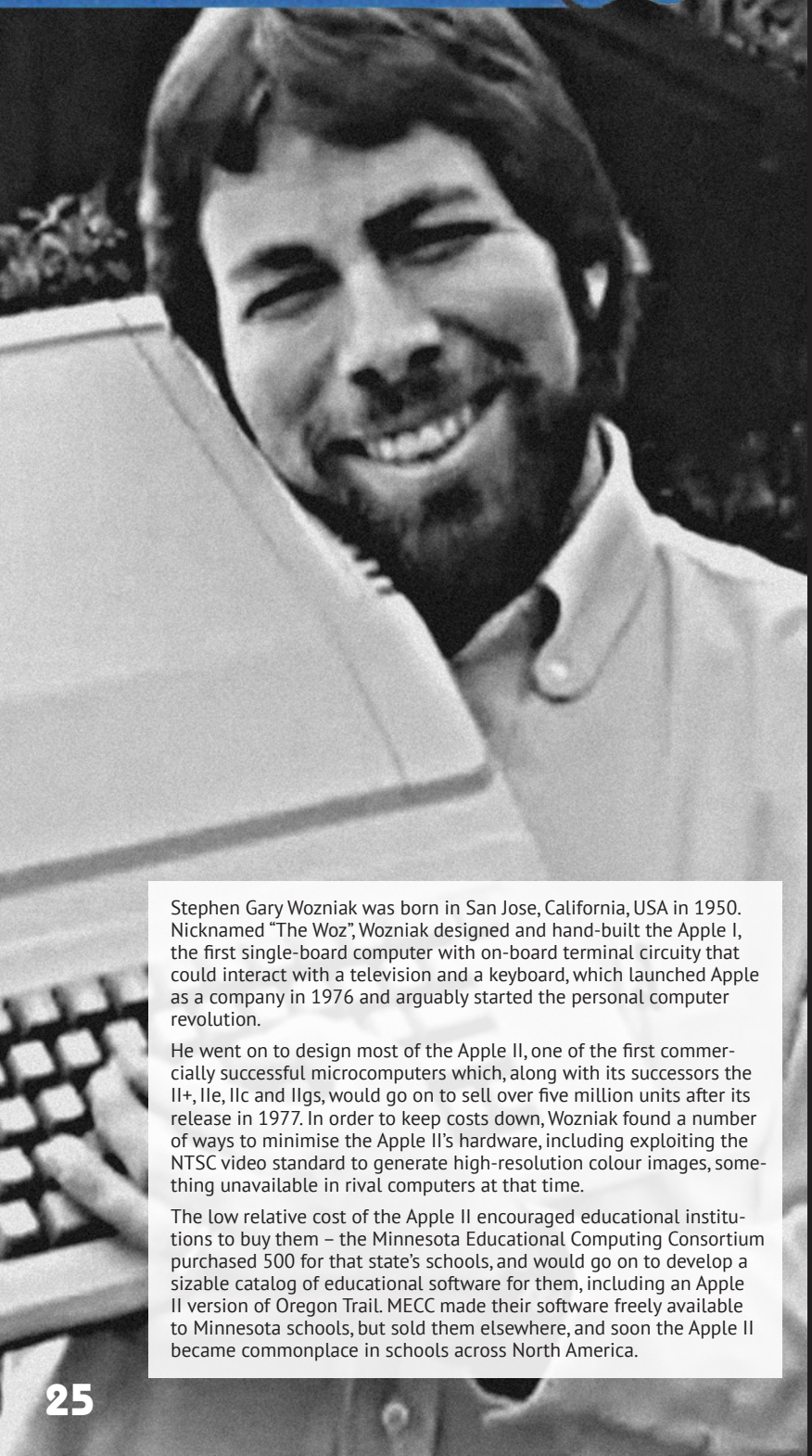
Enter the demoscene. In their singleminded drive of one-upmanship to milk surprising performance out of hardware from prehistoric times, any underexplored (undocumented ideally) hardware or software quirk represents a rich vein of mad props just waiting to be discovered...just sometimes you need to bottle the hardware up and allow it to ferment for a couple of decades before new modes of thought reveal the miracles that were hiding there in the silicon in plain sight the whole time. And what they have found (really, what they have always known, but really started taking to heart around 2011, after it had been steeping for some 34 years) is that PETSCII, divorced of its original context (slow modem speeds with a hard upper limit imposed by the floppy diskette controller the modem attached to), can prove to be a perfectly serviceable alternative to its younger sibling ANSI art where single-screen textmode art is concerned. ***Continued on page 103***

Commodore systems, including PET, CBM, VIC, and Commodore 64, have 128 different characters (plus the 128 reverse images) that can be displayed on the screen. There are more than 128 codes (not all are displayable characters) that can be generated from the keyboard and handled by BASIC. The extra codes include cursor movements, color controls (on the VIC and C-64), and screen formating controls (on business machines). There are two complete character sets available (one at a time). One includes an extensive array of graphic characters, and the other includes lower case, at the expense of 26 graphic characters. PETSCII is a translation of ASCII codes to CBM codes. In lower-case mode the lower case letters are where ASCII upper-case is normally located and the upper case has the bit $80 set. **MICRO November 1983**

This chart of the PETSCII character set shows the available graphics characters. As you can see, there are many more of them available in uppercase mode, at the expense of losing the ability to display lowercase characters.

THE ARCHIVIST

Data Recovery and Conservation



Introduced in 1977, the Steve Wozniak-designed Apple II used a number of ingenious tricks to keep hardware costs down, and prices low. Initially, the Apple II only had cassette tape as an option for storage, but it was cumbersome and slow, and it soon became obvious the Apple II would only truly succeed if it supported a disk drive.

While tape was fine for games, productivity and business software could be quite large, its users needed to save data frequently, and it often required random access (the ability to access data out-of-sequence) – none of these were practical with tape storage.

The situation came to a head after Apple executive Mike Markkula wrote a chequebook-balancing program whose data files took too long to load from tape (one imagines longer and longer as the user's chequing history grew.) He asked Wozniak if it was possible to design a disk system for the Apple II.

Typically, disk drives of the time communicated with computers through complicated (and expensive!) floppy disk controllers that did most of the work in hardware, using customised integrated circuits. However, the Apple II had an advantage over its rivals in its fast system architecture, and Steve realised that much of the work done by this expensive hardware could be done in software, instead.

While at Hewlett Packard, Wozniak had also designed a simple, five-chip method of controlling and accessing floppy drives. By placing similar circuitry on a computer card that could be inserted in one of the Apple II's seven card slots, and writing a small "bootloader" program that loaded controller software off of an arbitrary location on the floppy disk, Wozniak was able to design a system that kept hardware complexity (and manufacturing costs) to a minimum.

Even better, the disk operating system (or DOS) software loaded into the computer could be written by the user, creating all sorts of flexibility for

Stephen Gary Wozniak was born in San Jose, California, USA in 1950. Nicknamed "The Woz", Wozniak designed and hand-built the Apple I, the first single-board computer with on-board terminal circuitry that could interact with a television and a keyboard, which launched Apple as a company in 1976 and arguably started the personal computer revolution.

He went on to design most of the Apple II, one of the first commercially successful microcomputers which, along with its successors the II+, IIe, IIc and IIgs, would go on to sell over five million units after its release in 1977. In order to keep costs down, Wozniak found a number of ways to minimise the Apple II's hardware, including exploiting the NTSC video standard to generate high-resolution colour images, something unavailable in rival computers at that time.

The low relative cost of the Apple II encouraged educational institutions to buy them – the Minnesota Educational Computing Consortium purchased 500 for that state's schools, and would go on to develop a sizable catalog of educational software for them, including an Apple II version of Oregon Trail. MECC made their software freely available to Minnesota schools, but sold them elsewhere, and soon the Apple II became commonplace in schools across North America.

software programmers, who could use a variety of methods to "copy protect" their disks.

However, the amount one could store on a floppy disk was small. The Apple II's chief competitor, the TRS-80 Model I's floppy drive could only store a paltry 85 kilobytes on a single disk. Steve saw room for improvement. By changing the way data was encoded (stored in a simplified way that could be restored without loss) onto the disk, he was able to increase the amount of space available to 113K, a substantial improvement.

How does Group Coded Recording work?

By imposing constraints on the way the binary 1s and 0s that make up data are stored on the disk, there is less space wasted by "overhead" – additional information necessary to define which bits belong to what byte of data. Due to the simplicity of the Disk II design, storing data was subject to the following rules:

- Between any two one bits, there may only be at most one zero bit.
- Each 8-bit byte must start with a one bit.

The easiest way to conform to these rules was to place an additional "clock" bit after each bit of data. While this worked, it required one additional byte of overhead for each byte of actual information, and didn't provide any additional storage capacity over the TRS-80's drive.

However, a month prior to shipping the Disk II to users, Steve realised that he could encode the data in such a way that provided five bits of data for every three bits of overhead.

In binary form, there are 34 bytes that conform exactly to the rules listed above. By using software you could translate sequences of 32 of these bytes to and from the range of 256 8-bit bytes. This allowed for 13 256-byte "sectors" of data on each of 35 "tracks" for a total of 113K.

By allowing for two zero bits in a row, Apple was later able to increase the amount of useful bits to six, expanding available disk storage to 140K, almost double what the TRS-80 could store using the same hardware.

Steve worked over his Christmas holidays in late 1977 in order to get the drive ready for demonstration at the 1978 Winter Consumer Electronics Show (see magazine clipping to the right) where it was well received. However, it still needed a DOS (Disk Operating System) in order to be useful to the Apple II's BASIC operating system. This was contracted out to Shepardson Microsystems, who delivered the DOS for US$13,000 in just 35 days.

Now sporting the cheapest-available functional floppy disk drive system and business applications such as VisiCalc, a spreadsheet program, the Apple II was ready to go on to great success. The fast speed of the drive would allow Apple to fend off later challenges from Commodore and Atari, and keep it and the later IBM PC the top two business computer platforms well into the 1980s.

"Say What?"

Steve Wozniak's design of the Disk II controller made many parts on the Shugart drive (the first available 5.25 inch disk drive) redundant and so Steve Jobs demanded Shugart sell Apple drives with these components removed. Upon receipt of the drives, Steve Wozniak discovered many of them did not work properly. When questioned, a Shugart employee admitted that the stripped-down drives were actually defective rejects – Shugart was hoping that Apple would abandon the Disk II project thinking that it was a failure, and resell Shugart's more expensive drives instead. *'All's fair in love and business' –Anon.*

New from Apple.

Introducing Disk II™: instant access to your files.

Our newest peripheral is Disk II, a high-density 5¼" floppy disk drive for fast, lowcost data retrieval. It's perfect for storing large bodies of data such as household finances, address files and inventories; you can find any record in just half a second. No more searching through stacks of cassettes; with a few keystrokes, your system will load, store and run any file by name.

Disk II consists of an intelligent interface card, a powerful Disk Operating System (DOS), and one or two mini floppy drives. Your Apple will handle up to seven interface cards and fourteen drives, for control of nearly 1.6 megabytes of data, with no expansion chassis. The combination of ROM-based bootstrap loader and an operating system in RAM provides complete disk handling capability, including these special features:

• Soft sectored • Random or sequential file access • Program chaining capability • Universal DOS command processor works with existing languages and monitor • Full disk capability in systems with as little as 16K RAM • Storage capacity: 113 kilobytes/diskette.

See Dis... ...le dealer. DOS at...

Apple showed their "Disk II," a so-called intelligent peripheral for the Apple II. It was being demonstrated most impressively with stock price data from the New York Stock Exchange. The disk offers random and sequential access, 116 kilobytes per diskette in a 35-track soft-sectored format. Each track contains 13 sectors of 256 bytes each. Price is $495.00 Apple also reduced memory and system prices substantially.

Creative Computing, September 1978

Paleotronic was lucky enough to be given the chance to have a chat with Apple co-founder and engineer-extraordinare Steve Wozniak, who gave us a personal look into the development of the Disk II.

I LIKE TALKING ABOUT IT, it's a very interesting story, especially parts that are not so much told. And probably, you've read some of the common parts, about how I was in a staff meeting and raised my hand and said, "If we have a floppy disk in two weeks, can we show it at CES?"

I knew you could never design disk drives in less than a half year to a year plan in a company, and I had never been around disk drives, I had never studied nor been near hardware or software. All I knew was maybe my one way to get to Las Vegas wasn't just to ask and say "Hey, I'll help you with the marketing", it was that I might be able to do some engineering – but how do you do it?

Okay, very shortly after that, Steve Jobs got a floppy disk, (one) he'd been looking at before. Shugart was going to move from the 8-inch larger floppies down to a smaller 5-inch, and smaller is more personal, so Steve got me one of those. I opened up the data sheets, and I know how you can, if you record data on to a cassette tape, this is how I – how we had our Apple II working, you would record signals that went up and down in voltage, you play tones into a cassette tape, and when you played it back you got the same thing back, and you could count the timing between pulses and decide if its ones or zeroes.

So I was thinking a floppy disk must be like that somewhere. I studied Shugart's chips and schematics. They had a set of wires, maybe about ten or fifteen wires that carried data into their chips that then piece-mealed out a byte at a time and a bit at a time, and I looked at their diagrams and the bits were coming out either four microseconds apart or eight microseconds. For example, a zero might be a full eight microseconds before the cassette tape signal – the "floppy tape" signal – actually reversed itself. It might be eight microseconds, but if four microseconds in it flipped, and then four microseconds later it flipped again, the bit was a one. Ah ha!

Okay, that was the understanding I needed, and now, I was well aware that I had a computer, and the ability to put a few chips on it, to actually send data out at my rate. Why go through this big structure that speaks its own little language: "Click, here is a signal for here to record on the disk, here's a byte, let me know when you're done." I didn't need all that stuff! I just needed to write it, and so I started developing a very tight circuit, took almost nothing, and it was probably only a couple of days before I could write some ones and zeroes on to a disk. (But) I thought, how do you know if you wrote them if you can't actually read them?

So then, I sat down, "Oh my gosh, how am I going to read these?" and it might have been the weekend by the time I even had a tiny circuit. (I realised) the microprocessor (CPU) would actually have to be involved in the timing. This is bad programming practice in todays very advanced languages, (it's) very bad to base your timing on the microprocessor timing itself. Every thirty-two microseconds I had to write eight of these little 4 microsecond "chunks".

Our microprocessor ran at about a megahertz, so that's about one microsecond is the closest timing you could get, but I wrote code that very carefully timed itself so that every thirty-two microseconds, it put a signal out on the line to my little controller that then made those little four microsecond ups and downs – it made those "shift" out. There was a new chip that I had wanted to use for this, and it sort of inspired my thinking that maybe it could be used for a floppy disk controller some day. It was an eight bit register – you could load in eight bits parallel, and then shift them out serial, or vice-versa. And it was a one dollar chip, it was the normal little low-cost TTL chip, so I used that and now I could write the ones and zeroes. How do I actually read them back?

Of course _I_ could read them back, I could look at an oscilloscope (connected) to the read head and see that the signals are coming back, they are there – how do I detect them? And the solution I came up with there was even more unusual – I look back on my own designs and I have no idea, I had never read a book on it, I'd never done it, I'd never been around anyone who'd done it, I didn't have anyone telling me, "here's how you read the data from a disk". Yes, there was a big chip made, a big expensive chip that could sort-of do the whole job, but that's not my approach.

So, they're going to come back in four microsecond and eight microsecond chunks, and I've got to tell what's going on. Normally, you'd put put some signal into a timer that times up four microseconds, and then checks the line to see if its reversed or not – it's a complicated, many many parts procedure, which is why most floppy disk controllers were still fifty chips. And then I remembered a course I'd had at Berkeley, my junior year, in state machines. I was very good at understanding state machines. You have a number that is the state, it says where I am now in a sequence. It's kind of like the address of a microprocessor. And then you put in a few more bits of data, for example the one data bit coming from the floppy disk. You put it in, and then when a clock signal comes – clocks come ching, ching, ching ching… seven million times a second, I had clock signals, it decides (based) on my state now, and my state to come, where do I go?

Well, the decision chip was a one dollar chip, called a PROM. 256 by eight-bit PROM, a little PROM. You put in a certain number of inputs into it, and it decides what the output is, and the output goes back to the little register that holds your current state. So if there's a zero coming, the state might say "hold state fifty", a zero comes: "hold state fifty". A one comes: "go to state fifty-one". You could set up timing so that it could actually determine if things came in four microseconds, if they came in eight – very complicated to take your mind down to those little levels. It's like programming a four-bit microprocessor – it's tonnes harder than an eight-bit microprocessor, and this is like a one-bit microprocessor! Very difficult. Somehow, I finally solved it, and i could get the ones and zeroes back, but then I said, but how am I going to tell where the bytes start and stop?

I wasn't sure I was going to figure out how to do this, and then I realised there were a few of these four and eight microsecond bit codes that weren't used, that didn't correspond to any real data bits that could have come, but my method of detecting what's coming, what's coming, what's coming would slip, slip, slip, slip, slip, and eventually, after about six to eight of those little unused (codes) it would slip into line with the bytes. Don't ask me, it just happened! Total serendipity, I wasn't sure if I'd solve it or not.

I worked Christmas Day and New Year's Day and it came time to get to the show – I almost had it! I was working with Randy Wigginton, he was writing the higher level code to say – see, with a cassette tape, if you wanted to run a program called "checkbook" you'd have to grab a cassette tape, put it in a cassette tape player, let it play some tones for half a minute, and then beep, you'd have a program running. Then you could put another cassette tape in that said "my checkbook data". You could read it in… slow, slow, slow. We were used to big computer systems where you just said RUN WUMPUS. RUN whatever. I wanted to get to that point where I could type in RUN CHECKBOOK and it would run right off the disk. Or RUN COLOR MATH and it would run our flash card program for kids.

Randy was working with me, and we almost had it done. It was the night of the show, we had to fly to Las Vegas, stayed in this little motel called the Villa Roma. Played some good pranks on their phones. I used to travel with all my kids in those days, they didn't have any airline security even. Had a lot of fun. I reversed the buttons on one phone, instead of going 1, 2, 3 horizontally, it went 1, 2, 3 vertically so the next person (who stayed) would (dial) what they thought was right…

Also, I had gotten to design the first hotel movie system for a guy in Hollywood when I worked at Hewlett Packard and this hotel, I think – maybe it was a later hotel I got to, but it had movies and I was with Randy – and I said, "Oh, they have to encode your room number somewhere". I opened up the little box with a screwdriver, and there were some dip switches, and I switched them to another position, and didn't get billed for the movie.

Anyway, we were at Villa Roma in Las Vegas, and Randy and I started walking along this little section called the Strip – not like today's Strip, it wasn't full of resort, resort, resort, it was much smaller places. We walked down to the convention centre with our stuff and we sat their working, trying to get every little sector of ones and zeroes – the right bytes – on every sector on this disk, so when you put it in, you could type RUN – we actually simplified it for the time, you'd type R CHECKBOOK and it would run CHECKBOOK.

We worked all night long and we finally got it totally functional by 6:30 in the morning. The show was going to start and we'd been up all night! I said, "You know, we'd better make one copy of it. It's time to make a backup, I believe in that." I only had two floppy disks with me, That's it, period! I didn't have any good software to say "copy a disk" yet – we weren't at that point – so I'd slide a disk in, and I'd type one number into memory, (for example) a one, and then I'd CALL a little routine, and it would read all the data from track one. Then I'd flip the other disk in, I'd type a one in the right place, and then I'd go to a different address and run a program that said "write track one".

Read track two, write track two… switching the floppies about like the first Macintosh, and when I got all done, I looked at my two floppies – tthey weren't really labelled – and I realised that I'd copied the bad one on to the good!

So, that ruined that plan. I went to the hotel room – had to get some sleep – woke up at ten o'clock in the morning. By then, it's all in your head. All of the methods you've used are in your head, and you can recreate it accurately in a shorter time, and I managed to get it recreated probably by around noon. I took a floppy disk down to this little table we were at – we just had a table – and put the floppy disk on the computer and there it was running. Oh my gosh!

I also taught Steve Jobs how to play craps that trip, and I also taught Randy Wigginton, even though he was in high school. He won thirty-five bucks! The important things in life are the ones you remember with emotion and fun smiles.

I left out one part. The day before we went to Vegas, I thought why do we have these seven little chips – seven chips because we only had one drive, it would be eight when we shipped it – why do I have seven chips when these competitors have fifty chips _and_ a big one, an expensive one? So I pulled open a manual for a competitor's

floppy, I had got somewhere, (and) I started going through it and reading all the data specs of their chip that would do everything.

I finally realised at the end mine would do more, because I could write software that would modify mine, and in not too long a time after that – half a year at the most – I figured out (that) where i was writing four bits before, there were enough codes left over I could actually write eight bits, and all I had to do was extend the timing to allow four microseconds, eight microseconds or twelve.

So, allowing the twelve caused us a few little analog problems that we worked on (and) had to put in a little corrective part, but boy, that gave us 16 sectors instead of 13 – 16/13 times as much data, by writing programs on the processor, on the host computer (being an Apple II) – it's software was so involved with the little hardware I'd built (and) with the floppy disk itself, they were just all tied together in my head, it was all one.

I also improved the speed. One of the things is, you had a little head that had to choose a track, that the early floppy disk had thirty-six tracks. You'd be on track one (really zero, that's where programmers start) and if you wanted to go to track one, *click*, you'd wait 15 milliseconds and it's there. Then you'd say, go to track ten, and the Shugart drive, with its own circuits which I had ripped out, would go *click* *click* *click*, fifteen milliseconds for each track to make sure it stopped without overshooting.

I said, "Wait a minute…" high-school physics, or anybody's experience – you push something heavy, you know, a heavy wagon, and it goes faster, if you keep pushing the same it goes faster and faster, and then (you) slow it down. So I got this idea, why don't I speed up the head that's moving from track one to track two to track three… speed it up until it's half-way to the destination – which I know – and then start slowing it down so that it doesn't overshoot at the end. I made a little table (to calculate the distances) and I love the sound that my disk drive makes!

The disk drives in those days, when they went from track one to track twenty, you'd hear "ennnnnnnnnnnh" – this horrible sound like a buzz-saw. Mine went "shew, shew, shew." Beautiful sounding, and it did it twice as fast.

Could you please talk a bit more about how you discovered the five-and-three Disk II encoding method?

At first, I would just put out a byte of zeroes and one, and every two bits was two four microsecond slots. So if it was "one zero", it was a switchover and that meant it was a one (bit), and if it was "one one", it was just a zero bit. So I would put those out, but then I realised that without screwing out the timing that the disk drive was designed for very much, I will let it get it four microsecond chunks, eight microsecond chunks and twelve.

Engineering-wise you design things to be optimal for four and eight, twelve might have had a problem. I realised I could store "five and three", that's what gave me sixteen sectors of data instead of thirteen. The code was so hard to write because I was doing this very bad thing of using the microprocessor timing – how long does our microprocessor take for every single instruction, and you have to count on it always being exact and the same, so far a violation of… actually even good design principles back then would have been more generous. But I made up for it by other parts of the design that were so good. So, what I did was I had this tight code, that has to be in loops to get five bits of data in thirty-two microseconds instead of four bits of data, and always loop back – no matter how many loops it took – to loop back and keep the timing exact.

It was so hard, for about a month I worked on it every single night, starting near the end of the day – figuring out the methodology, the sorts of variables I would have, what they would hold, how they'd be – and then I would start working through the process that was in my head so thoroughly, and I'd get 90% done maybe, by four in the morning, two in the morning, and I'd just be so tired, "I'll go home and finish it tomorrow."

And I went close to a month thinking I'd always finish it tomorrow, and finally one night – Steve Jobs kept asking me every day, "Where's the sixteen-bit code, how's it coming?" and so finally I stayed all night, I got near the end, 90% done, and I just worked it through and finished it, didn't have to start over again the next day. That was tough for me.

After this, there was something that came up that was very important to me. This floppy disk was getting so much notoriety in the company, out of the company, (because it was such an) amazing design – I like engineers to look at my work and say, "How did you ever come up with something such a different way?" I went over to our building where we had some technician groups. They worked with turning designs like mine – I had designed a printer controller code, a serial controller card, Wendell Sanders had designed a modem control card – we would send these control cards over there, and they would work with the company that would make a PC board for it. That was one of the key steps to making a product. Turning a design and wire into a product that can be manufactured, you need a PC board.

So I went over to that group and they said that their PC board company was kind of busy, but one of the technicians, Cliff Houston, said, "Why don't you do it yourself?" Well, my gosh, sure I

can do it! Okay! I just didn't know where you get the supplies – he had all the supplies. Laid it out on a drafting board. Clear pieces of mylar, and coloured tape that traces out where all the silver traces on the PC (board) will be, and some layouts that match the pins that the chips would plug in at, and I laid it out and I worked every night for at least a week, maybe two weeks.

Late late late, the two Houston brothers, Dick and Cliff, would go home – midnight, one, whatever. I always worked past them, and maybe an hour or two… I was working so close, because I wanted my chips to be as close as possible, the wiring to be as short as possible, it was all in line with my design philosophy, and I wanted to take every (possible moment) to lay every little trace as perfectly as it could be. I got (it) done one night, and Cliff Houston came over, and asked, "How many feed-through holes do you have" – that's where you have to drill a hole to connect the top wire to the bottom (underside) of the board. Very common. A board that size might even have twenty or thirty of them. I had eight, because I had designed to lay out the chips in the exact optimal order. I might have had thirty if I'd done it otherwise, and nobody cares about it, because it's just the way you do it.

So he said "Eight, huh?" I said, "Yeah, (but) I figured out that if I had designed the shift register to go left to right instead of right to left" – the shift register was that part that converted eight bits into one and vice-versa – "If I had only designed it the other way, I would've had three fewer crossovers," and he said, "Steve, you mean you're going to go with less than perfect?" Okay, so that's a challenge! So what I did is I took it all apart, I ripped off all my little red tapes where the wires would go, thought it out – I redesigned it on paper to be the other way, and then I laid it out – I don't even know if I ever built one and tested it – and then I laid it out like that and for the next week or two, every night until two to four in the morning.

I came in to a staff meeting, and at the staff meeting Steve Jobs accused me of slacking off for coming in every morning at ten in the morning – he didn't know I was doing this. You know, that board was so important to me, because it represented myself. So I kind of blew up at that board meeting and explained how late I'd been working every night on a real product. I won that one!

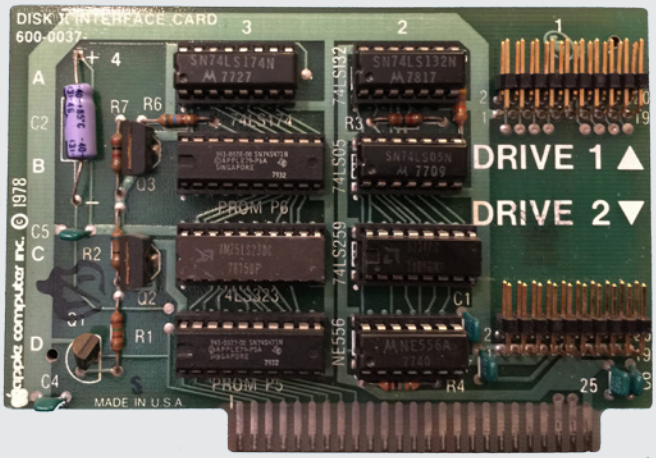
So, because I realised that (with) all of my resources, including the microprocessor, the hardware that was extensible through slots, and some software, I could do the job locally and save an awful lot of this mucky-muss of changing a whole bunch of things and to send out bytes with a one-bit for the data's coming and wait for a zero to say, okay it got received – I just got rid of all of that junk, I like to get rid of middlemen.

I could have done it on any other small computer with a microprocessor that had at least one slot. The only difference the other two personal computers out at the time that you could just take them out of a box and use them, were the Commodore Pet and the TRS-80, and they didn't have slots to a microprocessor. They had serial busses coming out, but that means that the microprocessor data has to go on a serial bus at a slower speed, and come out and somehow try to direct a floppy disk what to do, and you can't keep the metadata – where are the files on the disk? – you can't keep any of that in your RAM when you do that, so they weren't open to the subject. Our slots made it possible.

But there were things that called themselves computers before us that weren't really full computers unless you added so much no person could afford them, and those were like the Altair, and they had slots, and it could've been programmed on to a computer like that, or even super-expensive not sold to personal people computers like they had at Intel. I could've done the same thing with a floppy disk.

I just thought of it partly because my steps were, (first) I like to minimise everything, get rid of everything you can – I don't have time for a huge design, to actually build it and construct it and test it and all, and secondly, because I'd never done it before. I just sat down, figuring out that they wanted these four microsecond and eight microsecond chunks – I didn't know how a floppy disk worked, ever, and then it all started flowing into my head of a trivial way to create it.

I took out twenty chips that Shugart had to do all that stuff, including the chips from them that would do that little fifteen millisecond track one… track two… track three… track four… they had chips (to) do that. In software I can count fifteen milliseconds so trivially and just send the code out, I don't need any extra chips.



One of Steve Wozniak's finest works of master engineering, the Disk II card did away with a number of expensive chips. replacing them with ingenious software tricks and the underlying hardware of the Apple II.

Confessions of a Disk Cracker: the secrets of 4am.

Software preservationist @a2_4am talked to Paleotronic about the origins of his motivations, and his continuing exploits.

Why did you choose to start aggressively de-protecting, archiving and re-distributing Apple II software?

It's tempting to rewrite history and give myself some noble purpose for starting this hobby, but in this case the truth makes for a better story. My parents bought themselves an Apple //e when I was 10, and it quickly came to dominate my leisure time. Pirated software was rampant, and I idolized the crackers whose names I saw flash and scroll on the crack screens of the games I traded with my friends. I also admired the few who documented their methods in cracking tutorials, initially distributed as BBS text files and later collated and redistributed on disk. I PEEK'd and POKE'd and CALL'd many late nights as a teenager, but I could never quite put it all together.

In late 2013, I acquired a real Apple //e and bought a few lots of original disks on eBay, mostly arcade games that I had acquired illicitly in my youth: Sneakers, Repton, Dino Eggs. To my surprise, the originals had more content than I remembered! Sneakers has an animated boot sequence. Repton has a multi-page introduction that explains the "back story" of the game. So I set out to create "complete" cracks that faithfully reproduced the original experience. I decided to document my methods because I enjoy technical writing and because I had admired the classic crackers who had done so. I decided to leave out the crack screens, although a handful of my early cracks do have Easter eggs where you can see "4am" if you know how to trigger it.

One of those eBay lots had an educational game, "Ten Little Robots." After cracking it, I couldn't find any copies of it online, which seemed odd. Surely everything has been cracked? Perhaps it was just mis-named or mis-filed? Then I found another disk that seemed to be a first-time preservation. And another. And it slowly dawned on me that maybe not everything has been cracked.

I mentioned this to Jason Scott, and he set me straight. Preservation is driven by pirates, who are driven by ego but constrained by the technical limitations of their era. In the 1980s, this meant storage space and network speed. Nobody got kudos for cracking "Irregular Spanish Verbs in the Future Tense," no BBS would waste the hard drive space to host it, and no user would sacrifice their phone line to download it. So it never got preserved in any form.

And even the things that did get cracked weren't fully preserved. Those same technical constraints led to a culture where the smallest version of a game always won. That meant stripping out the animated boot sequence, the title screen, the multi-page introduction, the cut scenes, anything deemed "non-essential" to the pirates. The holy grail was cutting away so much that you could distribute the game (or what was left of it) as a single file that could be combined with other unrelated games on a single floppy disk.

30 years later, that's exactly what I saw: half-preserved arcade games, a smattering of educational software, and virtually nothing else. I realized I could have a real impact while having just as much fun, just as much intellectual challenge. Along the way, I've discovered that educational software is rich with history, personality, humor, and technical achievement. It's been delightful.

Did you have any concerns over copyright? Do you feel the ethical considerations over lost software outweigh the rights of the copyright owner to restrict distribution of their works?

I host the write-ups and deprotected software (as disk images) on archive.org. They fully comply with DMCA takedown notices. They've never received one for anything in the 4am collection. In fact, just the opposite – I've had several authors find their own software and thank me for preserving it. One author even apologized for the copy protection. He understood it was a "necessary evil" at the time, but he was so glad that someone had finally bothered to cut through it. He said it was so exciting to be able to experience his own work again, for the first time in decades.

Since most of the Disk II's higher-level functionality is based in software loaded from the disk itself, this allowed for a large variety of copy protection schemes. How has this been a hindrance to saving Apple II software?

We still can't make perfect digital representations of Apple II floppy disks. Disks are analog, physical objects, made up of hundreds of thousands of magnetic flux changes. Those changes are stored in a physical layout on a physical disk and read by physical drives with their own variances and limitations. Disk II drives leave most of the functionality to software, and software exploits every possible edge case.

Where copy programs would drop bits, protection schemes checked for missing bits. Where copy programs would misalign data across tracks, protection schemes checked for cross-track alignment. Oh, your copy program can't read some data on the disk when it's physically too close to other data? Guess how we're laying out our data on our next disk! And so on. It was a big cat-and-mouse game, an endless war that only ended when everyone lost.

All of that physicality is hard to capture digitally, and for decades there were no serious attempts to try. In the 1990s, people devised ways to digitize some

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COMPACT disc DIGITAL AUDIO

First demonstrated at the Consumer Electronics Show in 1982, the Compact Disc was an evolution of the optical LaserDisc format created by Philips and MCA. Philips partnered with Sony to develop the new disc, initially intended for digital audio storage. It met with steady success, eventually supplanting cassette and vinyl by the early 1990s.

However, being a digital format, data storage was an obvious alternative use case for the CD. This was recognised as early as 1982 by Japanese manufacturer Denon, who developed a method of storing 553 megabytes of random-access data on a single disc. Denon partnered with Sony to introduce the first CD-ROM drive, and then Sony partnered with Philips to extend the capacity to 650MB.

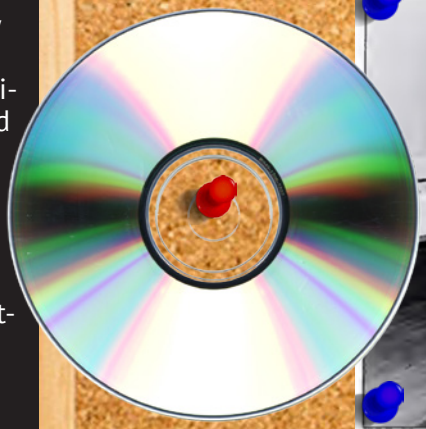
Due to its vastly increased storage capacity over floppy disks (450 1.44mb floppies!) the CD-ROM opened up a whole new world of "multimedia"-rich software, with large libraries of digitised images, full-motion video, entire collections of books, large databases and so forth. Encyclopedias were the first popular use for the new format – old paper-based encyclopedias took up several volumes and thousands of pages, often had limited and/or monochrome imagery, and obviously no video!

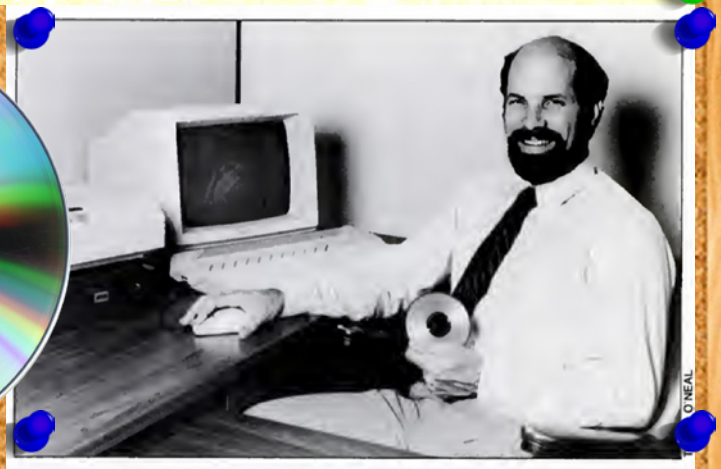
Now, an encyclopedia could have a wealth of colour pictures, audio and video as well as interactive features such as quizzes and games. Stand-alone games also benefitted, with new titles leveraging the increased storage capacity to include character voiceovers and professionally produced video "cutscenes" which enhanced storylines and created a more immersive experience for players.

Could you imagine loading a game like Halo off of floppies? Thank goodness for the CD (and later the DVD)-ROM!

Compact Discs as Read-Only Memory for PCs Byte, January 1985

At the fall COMDEX show in Las Vegas, several companies announced products using a standard compact disc (CD) as a read-only-memory device for computers. Each CD ROM can store up to 550 megabytes of data (about 275,000 pages of text) using the same 4.72-inch disc format used in CD digital audio recordings. Philips Subsystems and Peripherals Inc., Hitachi America Ltd., Sony, and Denon America Inc. all announced or showed CD ROM drives at COMDEX. Earlier, 3M announced that it will produce discs for use in CD ROM drives. Sony and Denon both expect to sell drives to computer makers for less than $300; with a controller, a CD ROM should retail for substantially less than $1000.





Activenture's Tom Rolander, with Atari's CD ROM prototype: It takes only three seconds to find every reference to a single word in a 58 million-word encyclopedia. Infoworld July 1985

00 times more storage on new compact-disc ROM Radio Electronics June 1985

A breakthrough by Nippon Columbia of Kawasaki, Japan (credited with having developed digital audio (PCM) recording in 1972) makes it possible to store 550 megabytes on one side of a compact disc. This is the equivalent memory potential of 500 to 1,000 ordinary 5¼-inch floppy discs. All the application software a computer could ever use (including the necessary documentation) could easily fit on one Compact Disc Read-Only Memory (CD-ROM). The new disc has the same dimensions (4¾ inch or 120 mm) and uses the same type of pickup mechanism as an audio CD.

The new CD-ROM computer drive is produced in the United States by Denon America Inc., subsidiary of Nippon Columbia. The Denon interface circuitry permits connection to practically any personal computer. The enormous storage capacity (the equivalent of more than 275,000 pages of text) provides exceptional opportunities to include high-resolution graphics to accompany and clarify the text.

Likely applications for the new CD-ROM disc are storage of reference works, directories, volumes of professional journals and catalogs.

Paleotronic had a chat with archivist and documentary film-maker Jason Scott (Get Lamp) about his efforts to preserve Apple II and other vintage computer software...

Firstly, could you give a little background on how the Internet Archive came to be a host for vintage software?

The Archive has been doing software archiving for quite some time, easily back into the early 2000s. At the time, it was to simply mirror TUCOWS, the Canadian software archive that has since become quite the powerhouse ISP and internet presence. We mirrored it, and that was.... it. There was a general set of "data" we allowed people to upload, but left it at that - you were very much on your own to understand, download, and process. It was not great.

I joined around 2011, and at that point, I was asked to give the whole place a boost, and I really, really did - absorbing everything "vintage" I could find from my own archives and archives around the net, so we jumped far up in terms of actual "old" data being online, although a whole lot was locked away in .ZIP files or CD-ROM images and so on. But I think we're the largest all around software archive in the world, where you can download everything in our collection, at any time, with no restriction.

Secondly, why did you choose to start aggressively archiving Apple II software?

Totally my own bias. I love Apple II software, and there's been a number of good archives, including the Asimov Archive, that have spent many years collecting Apple material together. It was a big part of my childhood, so that helps. The fact it comes in units of very small (140k) disk images also makes it easier to work with, and the resulting software has a simple and crafted beauty I enjoy. Connecting with the KansasFest (see Community Calendar) community made things even more enjoyable, since there was a vibrant, caring and smart group of people involved with the software as well.

Again, thanks to the efforts of people long before myself, there were thousands of Apple II disk images floating around, so putting them on the Archive was a no-brainer.

The Disk II allowed for a large variety of copy protection schemes. How has this been a hindrance to archiving Apple II software?

Well, 4am discusses the role of copy protection in preservation better than I could ever hope to. The main issue is that in the beginning of the Apple II software industry, people could write diabolically involved protection schemes, which pirates then had to return fire utilizing hardware and software trickery of an even higher order.

The result is that unless you were prepared to truly sink into that knowledge, a piece of software that wasn't inherently sexy would blockade itself from all sides, right into ensured oblivion. Looking at the huge-level amount of technical effort expended to create Passport, and seeing the wide range of software titles coming to light in the wake of this effort, it's obvious that a lot of Apple II history was hanging in the balance between remembered and forgotten.

A great example are Educational titles, which simply lacked the cachet to be traded, and games, which got cracked quick and dirty and turn out, in many cases, to have never been truly preserved because people would see a title "out there", watch it boot up a title screen (or just the game itself) and go "Well, that's forever."

Close levels of scrutiny have been finding dozens, maybe hundreds of these oversights, and watching them backfill over the past 5 years has really hinted at how much more might be down there.

INTERNET ARCHIVE

Based in San Francisco, The Internet Archive is a "digital library" that provides free public access to collections of digitised materials including software, music, movies and nearly three million public-domain books. It also takes billions of periodic snapshots of webpages.

The Internet Archive hosts an extensive collection of vintage computer software, for a number of different platforms including the Apple II, Sinclair ZX Spectrum and the Atari 8-bit computer line. The Internet Archive also hosts archives of console games, for systems such as the Sega Master System and the Colecovision, and much of its available software can be used through emulators embedded in their associated entries.

The Internet Archive also hosts a large collection of vintage computer and video-game magazines.

It can be reached on the Internet at archive.org

Although you would obviously prefer "clean cracks" of software (which haven't been altered by the person who de-protected them) is there a place for "cracked" disks? Do they have their own historical significance?

I like having both, frankly. Or all three - I would include ways to have completely untouched disk images online as well. There's lots of room on the Archive for all approaches, and they each have their character, uniqueness, and ubiquity. The piracy-oriented cracks of the 1980s were chances to crow about technical superiority in a very tiny but very interesting battle, while the clean cracks allow easier transfer of the software in the modern era. The full protected images will be of a different but important use to historians as well.

You realised at some point that having in-browser emulation would encourage IA visitors to try out the software. What were the challenges in getting emulation to work?

Brewster Kahle, the founder of Internet Archive, hired me and set me on the "software is locked up" problem almost immediately. He wanted the ability to "play" software like you can "play" movies, music, books and so on at the Archive. With a lot of media hosted by the organization, you can simply click on a button and begin reading, listening and so on. He wanted that for software and kind of left it up to me how to do it, with some thoughts on how it might be possible.

His suggested idea was what other organizations have done, which is set up servers that are playing really good emulations, and then let users access these servers via their browsers running what could be described as "remote access" software. This gets things going very quickly, and it works nicely, but it doesn't easily scale, especially when you are running things close to the bone, as the Internet Archive prefers to.

I proposed working with some volunteers to port prominent emulators to run inside browsers using Javascript, so that every single user would be providing the emulator for the software on their own machine. This suggestion, which Brewster thought was insane, took a couple years to get going but has paid enormous dividends. We now emulate tens of thousands of old software packages, reasonably well, and people can make use of these old pieces of software basically instantly through the internet.

The challenges were mostly around getting a program named Emscripten (a utility which converts code to javascript) to deal with the unique and massive requirements of emulators, and then to clean up the mess and iterate. When all was said and done, we caused code changes to nearly every major browser, several emulators, and Emscripten itself.

So engineering-wise, it was a bear. But the results have been really notable - emulation in the browser is just part of the landscape, with some advantages and disadvantages, but providing a way to play old software very efficiently and letting the modern world incorporate the lessons of the past with little trouble. It's a triumph, and many, many good people played a part in making it happen.

Jason Scott is an American archivist, historian and film-maker. His documentaries include The BBS Documentary, a film about computer bulletin-board systems inspired by his personal archive of BBS material, website textfiles.com, and Get Lamp, about interactive fiction.

Jason works for the Internet Archive and speaks frequently at technology-related conferences on the subject of digital history, software and website preservation.

Jason also maintains a Twitter account for his (co-owned) cat, Sockington. Sockington has over 1.4 million followers.

How has the Apple II community been helpful in the quest to archive every piece of Apple II software?

The overwhelming majority have been helpful with memories, ideas, rummaging through their old collections, and offering up everything they can find and letting our hash-checkers and comparison utilities find unique items that in many cases might not have been thought of as unique. They've gotten the word out to friends, old places of work, and communities I would never have any reach in.

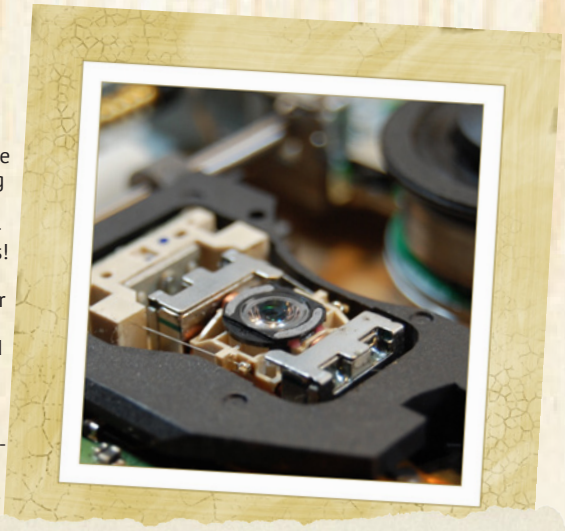
Once people find out those Apple II disks are worth taking a walk through, they've generously donated or lent disks to be imaged, and we've found thousands upon thousands of new images as a result. I wouldn't go so far as to say we're hitting completeness, but there's many relevant titles and accomplishments that are bootable in a browser or downloadable that most folks would have never seen again.

The amount of people who have been down on this effort have been so scant and rare that it's definitely a "man bites dog" situation; I could focus on them, but the arguments tend to be in the realm of "we've done enough" and "it will be confusing to have so much software available" and, well, life's short.

The Apple II community is a vast and variant world of tinkerers, geniuses and good people who love that platform and the folks in it a whole lot. I've enjoyed doing some small part to preserve it.

Thanks for all your work to save the past, Jason!

Left: This is a common cleaning disc for CD-ROM drives. The brushes, moistened with alcohol, spin as the drive attempts to read the disc, rubbing against the lens and hopefully cleaning any debris from it. May or may not work with slot-loading CD-ROM drives!



Right: A CD-ROM laser lens. In some older CD audio players and early CD-equipped consoles the lens is accessible to the user and can be carefully cleaned with a q-tip.

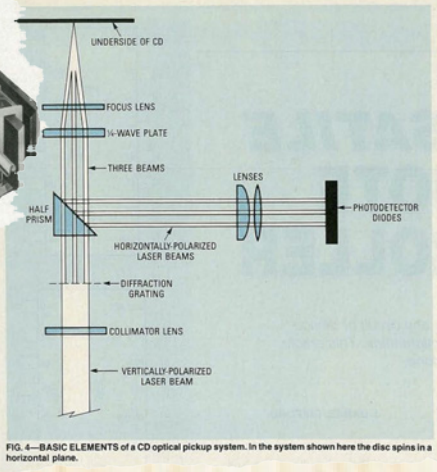


FIG. 4—BASIC ELEMENTS of a CD optical pickup system. In the system shown here the disc spins in a horizontal plane.

Optical pickup systems

Figure 4 shows the basic elements of the optical pickup (also called the optical readout) used by most slide-type CD players (the most popular type). The laser beam developed by the laser diode is applied to the reflective surface of the disc through an optical system (a series of lenses, prisms, gratings, and possibly mirrors). The beam is then reflected back through the optics to photodiode detectors (typically 6 diodes). The detector produces an output that corresponds to the audio stored on the disc, as well as tracking and focus signals.

In the system shown in Fig. 4 the disc spins in a horizontal plane. In many CD players, the disc spins vertically. Either way, it is essential that the laser beam follows the track of pits and flats as the optical pickup is drawn across the disc by the pickup motor, regardless of any possible disc eccentricity. That is called radial tracking, and usually involves a radial-tracking coil operated by a tracking servo to move the lens (and beam) as necessary.

Radio Electronics, November 1985

Compact discs are pretty robust since there's no physical contact between the laser "pick-up" and the disc, but things can still go wrong.

In a perfect world, people would always grab CD-ROMS only by their edges, never put the data side down on the surface of a table (or a dinner plate!) and only store them inside of their jewel case, itself stored inside a hermetically-sealed vault – but this is not a perfect world. As an increasing-number of youth-focussed titles appeared, such as educational and game software, so increased the likelihood of gumming up the lens on your CD-ROM drive with a filthy disc!

This situation would leave you with two outstanding issues: a dirty CD, and a non-working CD-ROM. First let's look at the dirty CD. You can wash a CD, but you need to do it gently, so that you don't scratch it.

Step one: run water from the faucet over the data side to remove larger grit.

Step two: gently rub a little dish soap over the surface of the data side with your fingers, working free any stuck gunk.

Step three: rinse it off. Check for gunk. If there's still gunk, repeat step two.

Step four: let it air dry. Don't use a towel or put it in the sun.

Now what about my CD-ROM drive?

Well, if some of the gunk that was on the disc ended up on your laser's lens, you have a problem. The laser can't read through gunk! If the drive is part of a console that has the lens in easy reach (such as the first Playstation) then you can clean it using a q-tip dampened with some isopropol (or rubbing) alcohol. Make sure it doesn't have any colourants added (some brands do!) Gently rub the q-tip against the lens, give it a moment for the alcohol to evaporate and then try loading a clean disc again.

If your drive is a tray-loading CD-ROM, like in most computers and consoles like the XBOX or PS2, you may need to use a cleaning disc. These discs have brushes you moisten with fluid (typically also isopropyl alcohol). You put the disc in the drive, and while it tries to read it, the lens is cleaned by the brushes. This can often take a few tries, and if it doesn't work you'll need to dismantle the drive – a subject for another day.

Collector's Corner

Filthy Floppies...what to do?

Like with CD-ROMs, a dirty floppy disk can lead to a dirty drive, which can be a much more serious problem. Unlike CD-ROMs, the surface of a floppy disk does contact the magnetic head that reads data from it. This means that the transfer of oil, dust or even flaked off particles of the disc surface itself can end up stuck to the head, creating an issue that can be difficult to resolve.

Prevention is the first rule here. Happily, 3.5 inch floppies have a spring-loaded shield that helps protect the surface of the disk from being contaminated, but 5.25 inch disks are not so lucky. If the disk isn't in a drive, it really should be in a protective sleeve.

There are millions of things a disk can pick up from a table, or a book, or your fast-food wrapper, none of which you want on the head of your disk drive! Put it in a sleeve, and put it in a box.

Secondly, unless you're the only user of your computer, you should inspect disks before inserting them into your floppy drive. If you see any dust or dirt, try to blow it off with a can of compressed air, available from most electronic components retailers or camera shops. Beware of spotting or discolouration especially on older floppy disks that haven't been used for a while – this can be mould, and while potentially cleanable, this is a subject for another issue.

So, what happens if a dirty disk gets through? Next is to try a floppy disk cleaner. Like the CD-ROM lens cleaner, these products typically come with a fluid you apply to the surface of the cleaning disk, usually a rough fabric pad. Be aware, however, that you should only use a cleaning disk if your drive frequently has problems reading a disk, or cannot read disks at all. Using it in a preventative fashion can actually risk damage to your drive's head, which in this day and age will likely mean needing to find another working floppy drive. You're much better off making sure the floppies you put in the drive are clean.

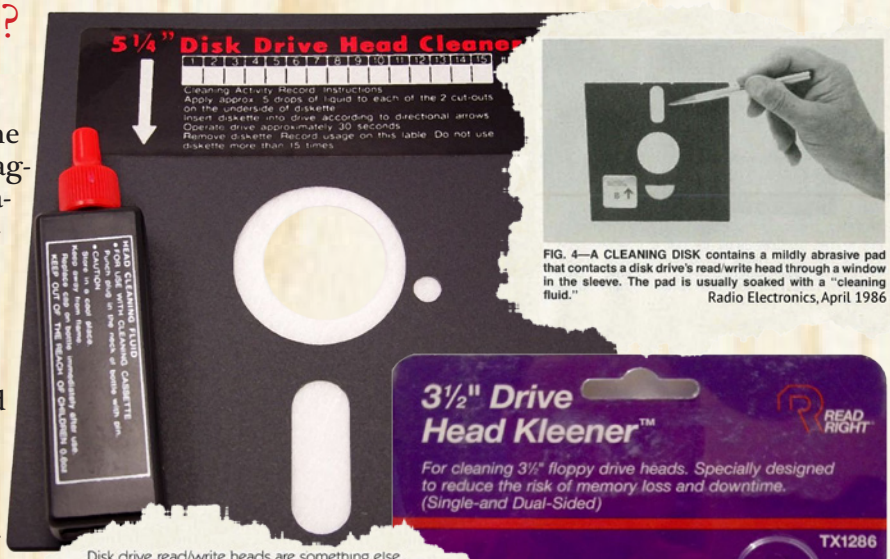


FIG. 4—A CLEANING DISK contains a mildly abrasive pad that contacts a disk drive's read/write head through a window in the sleeve. The pad is usually soaked with a "cleaning fluid." Radio Electronics, April 1986

Disk drive read/write heads are something else. Regardless how it's packaged, the actual cleaning device comes down to a mildly abrasive disc (usually fiberglass) packaged in a sleeve that closely resembles a conventional disk. (Fig. 4) Generally, a cleaning chemical is squirted on the disk to loosen whatever has supposedly accumulated on the head(s). Running the drive causes the cleaning disk to scrub the head(s) clean. Since a cleaning disk is abrasive (otherwise it wouldn't clean the head), there is considerable debate whether the cleaning disk can do more damage than it cures. (The service department of at least one major disk drive manufacturer will tell you not to clean the head at any time.) In fact, it's questionable whether disk drives ever need cleaning because data disks do not usually shed excessive oxide; if there should be some flake-off it is usually trapped in the microscopic pockets of the liner inside the disk sleeve. That's why the liner is there in the first place. Cleaning of disk drive heads should only be done when you are certain there is a problem that might be caused by an oxide build-up on the head—a really rare occurrence. How do you know when it happens? If you start to get frequent read errors cleaning the head is worth a try

Radio Electronics, April 1986

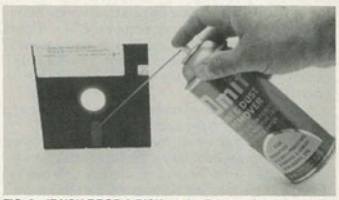
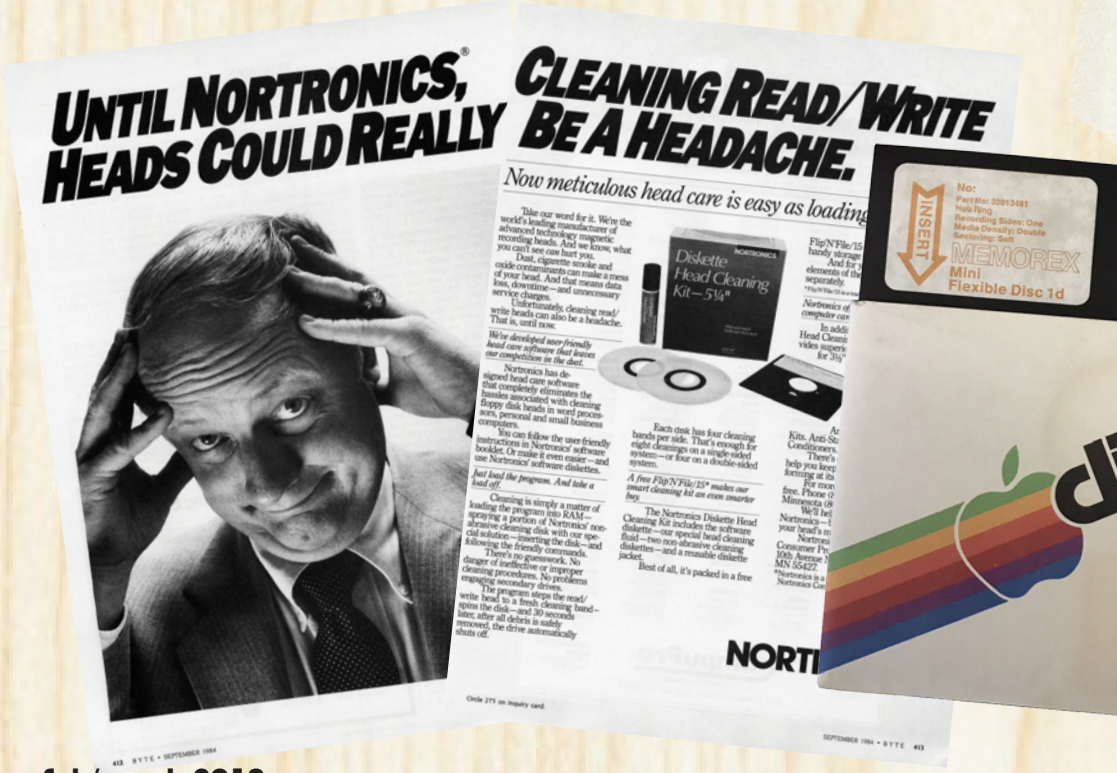


FIG. 3—IF YOU DROP A DISK on the floor, or dust has settled out, don't try to blow it away with your breath or a Freon-based aerosol product—either way you can cause moisture on the disk itself. Instead, blow the dust away with one of the "neutral" products photographers use to blow the dust off negatives. Radio Electronics, April 1986



Introduced at the Summer Consumer Electronics Show in 1978, the Speak and Spell was a line of electronic learning toys that featured one of the earliest commercially-available speech synthesisers. It quizzed children on the spelling of around 200 words by speaking them aloud using special integrated circuits designed for simulating the human vocal tract.

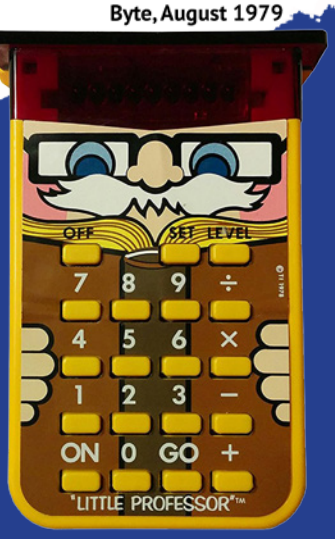
> One of the most fascinating computer games to appear in the past year is Texas Instruments' Speak and Spell, a sophisticated talking game that teaches children how to spell. A microcomputer-synthesized voice asks the child to spell a word by pressing keys on a keyboard. As each key is pressed, the corresponding letter appears on an LED display. If the word is spelled incorrectly, a second request is made. A running score is kept and announced after ten words.
>
> **onComputing, Winter 1979**

Manufacturer Texas Instruments, known mainly by consumers of the time for its invention of the handheld calculator in 1967 and subsequent line of calculators, began researching speech synthesis in the early 1970s, and in 1976 a project began centred around a proposed talking educational product. Texas Instruments had already introduced a "reverse calculator" math learning toy called the "Little Professor" and was eager to expand further into the educational market.

> An example of what is possible with today's technology can be seen in Texas Instruments' "Speak and Spell" toy, which for under $50 provides a keyboard, alphanumeric display, and microprocessor controlled speech feedback with a vocabulary of about 250 words and numerous messages and phrases. The functions that can be performed by the Motorola 68000 and the new generation of microprocessors it represents are limited only by the imagination. ■
>
> **Byte, August 1979**

TI had an advantage over its competitors in that it was also a components manufacturer. It had been producing its own microchips since the 1960s, and even developed one of the first computer microprocessors, in the early 1970s. Its TMC0280 one-chip linear predictive coding (LPC) speech synthesizer would form the "voice" of the Speak and Spell.

To store the words and phonemes used by the synthesiser, it used "bubble memory", a non-volatile type of memory storage that recorded binary 1s as nanoscopic magnetic bubbles formed on a thin film of magnetic-sensitive material. Bubble memory was thought to potentially replace hard disk drives, but that never happened as prices of hard disks fell.



Bubble memory-based expansion modules were available that provided additional vocabulary and minigames. TI would follow the Speak and Spell with "Speak and Read", focussed on reading comprehension, and "Speak and Math", which featured a math quiz and a numeric version of the puzzle game Mastermind.

Texas Instruments would continue to produce various incarnations of the Speak and Spell, some with LCD displays, until 1992.

> The Lynx was first unveiled at the Summer Consumer Electronics Show in Chicago, where it astounded the gameplaying world with its impressive array of features and technical specifications.
>
> The Atari Lynx is the world's first colour hand-held games console with a 3.5" LCD screen, resolution of 160x102 pixels, processor running at 16MHz, 64K DRAM, 16 megabyte game carts, multi-player options and custom graphics and sound chips producing 16 colours on screen out of a palette of 4096 and four channel stereo sound.
>
> Among the games due for release on the Lynx are *California Games* and *Impossible Mission* and *Treasure Chests* – plus a myriad of other game titles from third party developers.
>
> **ACE, December 1989**

THE TOY STORE

BATTERIES ARE INCLUDED!

What's that? Super Mario Brothers? On that tiny green screen? Well, actually, it's called Super MarioLand, and this is the Game Boy. Nintendo's latest techno-widget which recently hit the market in Japan. It's a proper hand-held console, into which you can plug games in cartridge form. That screen is a high-resolution dot-matrix screen of 144x160 pixels and to make it that bit more amazing. Game Boy has a headphone jack socket which provides the gamer with stereo sound! Heckymick! We hope to be taking a closer look at this micro-marvel in an imminent issue, along with the rest of the new generation of hand-helds. Keep those eyes peeled!

Computer and Video Games, May 1989

GM REPO

The Game Boy is here!

The Game Boy is best described as a portable console, rather than a souped-up G&W. The main distinction between the Game Boy and its primitive predecessors is its ability to take cartridges, and therefore not be limited to just one game.

The Games Machine, July 1989

The 1990s saw the rise of handheld portable video-gaming, with the three dominant console manufacturers, Nintendo, Sega and Atari all coming out with their own take on gaming-on-the-go. Could Nintendo's monochromatic Game Boy fend off its more colourful rivals? Paul Monopoli takes a head-to-head look at the Portable Wars...

Measuring just 103x210x38mm, the Game Gear is controlled by a Z-80A processor (as used in the Spectum and Amstrad) running at 3.58MHz. Screen size is quite large at just a shade under 3.5 inches and, although that's all we know at present, you can be sure that, as soon as we hear more, you'll be the first to know!

Computer and Video Games, June 1990

SEGA GET IN GEAR

It seems like hand-helds are all the rage, these days - what with the Nintendo Game Boy (now officially available in this country and selling like hot cakes), the Atari Lynx and the soon to be released TurboExpress GT (the portable PC Engine), it looks like portable consoles are the games systems of the future. Now Sega have jumped onto the bandwagon with their new Game Gear, and the C+VG crew had a good look at an imported machine from Electro Games.

GEAR BOX

The Game Gear is essentially a portable Master System with extra bits. It's about two-thirds the size of the Lynx, measuring a meagre 103 x 210mm and weighing 570 g. It has a built-in 3 inch, backlit LCD colour screen, which can display 480 x 146 pixels, in any of 16 colours from a palette of 4096 (the Master System has a palette of 128). Though the games we saw made very Master System-like noises, the Game Gear can produce sound or music on three stereo channels, and it has it's own stereo headphone socket for private listening.

GAME GEAR GEAR

The Game Gear's got a whole bundle of add-ons coming out as well, such as an optional TV tuner (so you can watch your fave shows wherever you want), a link-up lead, and a cable to connect the machine to the cigarette lighter of a car! But what about the games?

GAME GEAR GAMES

The machine was launched in Japan with three games, Super Monaco GP, Columns and Pengo, and after having a good look at all three we reckon they're pretty good. There are more on the way, including a conversion of Sega's stomach-churning coin-op G-LOC, as well as Wonderboy, Pro Baseball '90 and Dragon Crystal.

LANDING GEAR

The price? In Japan, this little wonder is selling for about 19800 yen, or about £79, with the games for only 3500 yen, or 14 quid! Could this be the end of the Lynx and the Game Boy? Not yet, because some of the importers who are bringing the machine into the UK at the moment are selling it for between £200 and £250! Virgin haven't set a price or a launch date as yet, but they hope to have Game Gears in the shops early next year, for under £100 - which seems much more sensible.

Computer and Video Games December 1990

Atari's Lynx, Developed as the Handy by Epyx, this little baby features a full-colour display, is nearly twice the size of Nintendo's GameBoy, and eats dozens of batteries for breakfast.

The One, October 1989

The Portable Wars

Paul Monopoli

Video games were introduced to the mainstream market in the 1970s, but really hit their stride in the following decade. Where parents might have had problems getting their children to stop watching TV and go to bed, they now had the same problem with video games. The Nintendo Entertainment System and the Sega Master System were the leaders in this, still rather newish form of entertainment, with Atari losing marketshare as the 80s rolled on.

Nintendo was coming up to the end of a very successful decade. Their Nintendo Entertainment System had gone from strength to strength, and their portable gaming line, the Game and Watch series, kept gamers going while they were away from home. There was a problem with the Game and Watch line though, and it is in part the fault of the Nintendo Entertainment System itself.

Nintendo had sought to create a home entertainment system that could captivate gamers for hours on end. Game and Watch titles contained a single screen, with progress involving the game becoming more difficult to the point where it was impossible to play anymore. NES games like Contra and Ninja Gaiden introduced the concept of "just one more go", pushing gamers to progress through a multi level story as they improved. With this evolution of gaming something had to change, and Nintendo wanted to keep its handheld market alive. Under the watchful eye of Game and Watch designer, Gunpei Yokoi, the Game Boy was born.

With its poor LCD screen, the Game Boy did not have a strong following at Nintendo HQ, with many employees dismissing it as a potential failure. However, the success of the Game Boy can be attributed to some very clever marketing and design. Containing a control layout similar to the established NES controller, the Game Boy entered the market with a plethora of gamers who could easily pick up and play the system with little need to learn how to use it. Sequels to successful NES titles also played a big part in the system's early success, but the biggest initial selling point was a its bundled game.

Tetris, designed by Alexei Pajitnov, was bundled with the Game Boy in the US, Europe and Australia. Nintendo quickly realised it had a 'killer app' with this addictive title, and used it to market their new handheld. Nintendo ensured that Tetris contained the ability to use the link cable, one of the features used to market the system. The biggest surprise for Nintendo was that not only gamers became addicted to the Russian puzzle game. Housewives were picking up their children's Game Boys when they weren't in use and dropping pieces into the well, creating lines and often beating their children's high scores.

While the Game Boy was an immediate hit with the public, at this stage it didn't have a rival. It stood alone in a new gaming market that Nintendo had created. With all of its success, the Game Boy was not without fault. While the public adored the little handheld, many critics noted that the screen was

poor, as was the battery life of the console. However, over the coming years these weaknesses would become the Game Boy's strengths as rivals to the handheld crown entered the market.

In 1986 development of the Atari Lynx began at Epyx software. At the time Epyx was best known for its 8-bit sports titles, Summer Games, Winter Games, and California Games. Known as the "Epyx Handy", this handheld was developed without knowledge of what was happening at Nintendo's Kyoto HQ. Like the Game Boy, games were stored on cartridges, but unlike the Game Boy the screen was in full colour. With the decline of the 8-bit market and the resources needed to design the console, Epyx had developed some financial problems. At the 1989 CES it tried to market the console to established manufacturers. If it could partner with one of the big shakers in the gaming industry then it might have a chance of releasing the Handy, while earning enough money to stay in the black.

Nintendo declined to partner with Epyx as the Game Boy was only a few months away from release. Sega also turned it down, leaving Epyx in a bind. Thankfully it found a saviour in the form of Atari, who, after two failed hardware releases, was still living off the scraps of its decade old 2600 console. Similar to the deal Nintendo pitched to Atari six years earlier, Epyx would manufacture the hardware and software while Atari would market and distribute the console. Sadly, the deal did not save Epyx, which declared bankruptcy before the year had ended. Atari now found itself as sole owner of the Handy.

Atari made some modifications to the device and showcased it at the following CES. Its new title, the Atari 'Portable Colour Entertainment System' was an obvious dig at the Nintendo Entertainment System, and the marketing line for the Game Boy, the 'Compact Video Game System'. The name may have concerned the Atari legal team, or it was simply a placeholder name, as when the console launched it was known as the Lynx.

While the Lynx was critically acclaimed for its processing ability and colour screen, the size of the console and poor battery life was noted in the gaming press at that time. Its Japanese rival boasted a huge library of games, while most of the successful Atari titles were games that the public had grown out of. There was no Tetris or Super Mario on the Lynx, and games like Chip's Challenge and California Games were poor substitutes. The reputation of Atari was also a factor, as many considered them a one hit wonder thanks to their 2600, with the 5200 and 7200 failing to make an impact with gamers. While Atari claimed that sales of the Lynx met with their expectations, it was obvious that Nintendo was the winner of this round. With two new rivals on the horizon it was clear that Atari's situation was about to get a lot worse.

The success of the Game Boy inspired Nintendo's rivals to develop their own handheld systems, and possibly take away a chunk of the handheld market from the Big N. Sega released its Game Gear in October of 1990, and at the 1991 CES the console had a decent amount of floor space devoted to it. While Sega was just releasing its first handheld console, Atari was debuting its Lynx 2, a smaller version of the original hardware, and Nintendo was improving on its already successful formula. The Nintendo Four Player Adapter allowed gamers to connect four Game Boy consoles, with new games like F1-Race and Faceball 2000 taking advantage of the new device.

The hardware in the Game Gear is similar to the Sega Master System, allowing many titles from that console to be ported on to the Game Gear. That, along with ports of Sega's successful arcade hits, saw it steal some of the market from Nintendo, but even more from Atari, who needed it now more than ever. Sega used the similarities between the Game Gear and Master System to develop an adapter, allowing gamers to play Master Systems titles on their new portable console. Sega also took a leaf out of Nintendo's book by marketing the console with the addictive puzzle game, Columns.

Pricing for the Game Gear was set between the Game Boy and Lynx, and advertising directly targeted Nintendo. It was apparent that Sega did not consider Atari to be a major form of competition, and it avoided any public squabbles with them. Nintendo considered some of the advertising to be offensive to its audience, though sales were not affected.

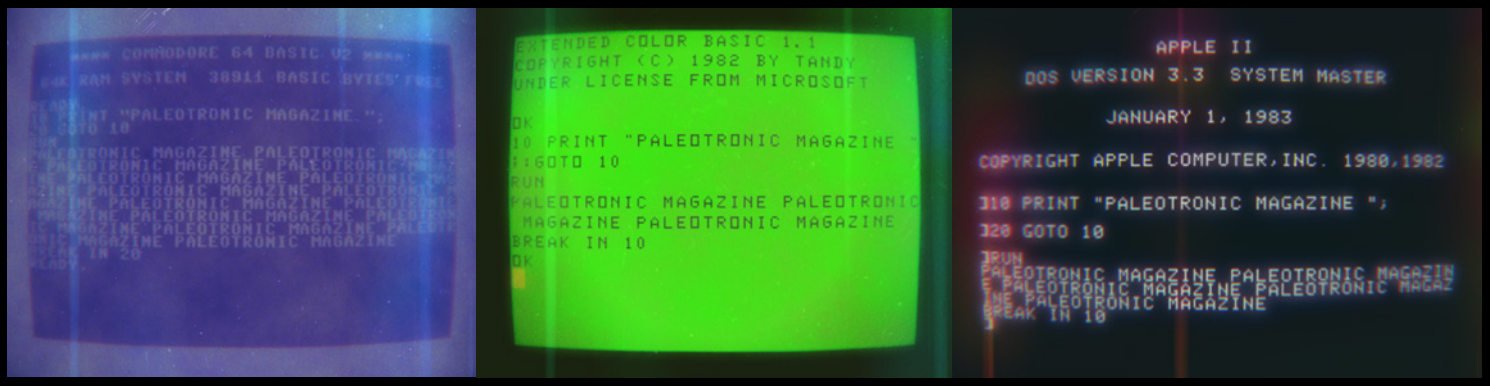
Commentators at the time noted that while Sega had the backing of a superior range of games, that the Lynx boasted a slightly larger screen and better battery life. However, these things weren't important to gamers, who wanted to play titles such as Wonderboy 3 and Golden Axe on the go. Sega was in a better financial decision than Atari, and was able to market its console into a comfortable second place behind Nintendo. The gaming press now noted that part of the success of the Game Boy was one of its biggest failings. While in 1989 the battery life was seen as poor its rivals had proven that colour was a liability, and that the blurry, green LCD screen actually helped the Game Boy retain its battery life.

As the early 90s were ending the handheld market was looking like a two horse race, with Nintendo taking a comfortable lead, sales of the Game Gear improving and the Lynx and Turbo Express trailing behind. Sega was starting to branch out into modifications for their Megadrive console, stretching its resources toward the Game Gear thin. However, Nintendo was just getting started and the mid 90s saw the death of the Lynx. Though Atari had improved the physical appearance of the Lynx with the release of the Lynx 2, it wasn't enough to save the console. Atari ceased production on the Lynx and pooled its resources into the failing Jaguar.

Sega decided to up the stakes and released a handheld version of the Megadrive/Genesis, known as the Nomad. With a library of games dating back seven years, the Nomad was designed to capitalise on gamers who were more concerned with bits than gameplay. It was a gamble that would fail, and the gaming press noted that two to three hours of battery life was even worse than the Game Gear. With the Saturn, Megadrive/Genesis, Game Gear, 32X and Sega CD all on the market at the same time, Sega were unable to provide sufficient resources to support all of this hardware. As a result the Nomad failed to catch on with audiences, who preferred Sega's earlier handheld over its portable Megadrive/Genesis.

Despite Sega publicly stating that it "believed the two (Nomad and Game Gear) can co-exist", it discontinued the Game Gear in Japan in 1996, and worldwide the next year. The Nomad never became a contender, and Nintendo ruled largely unchallenged over handheld gaming until 2004, when Sony released the Playstation Portable (PSP).

MICROSOFT BASIC



Before MS-DOS, Microsoft's biggest product was arguably BASIC. Variants of Microsoft BASIC shipped in most 1980s home computers, including the Commodore 64, Tandy Color Computer and the Apple II (as Applesoft BASIC). Standing for "Beginners All-Purpose Symbolic Instruction Code", BASIC provided a straightforward command syntax and the both beloved and despised line-numbering structure that made it easy to learn.

"Ah, BASIC. Loved by some, hated by many, but known by all."

What 1980s department store demonstration computer was not adorned with an infinitely repeating display of "Bob waz here" or all sorts of unreprintable vulgarities? For a great many:

```
10 PRINT "something something somesuch"
20 GOTO 10
```

was the sum-total of their experience with BASIC, but it would still teach them so much. In that simple two-line program there's an understanding of sequential execution (in the form of line numbers 10 and 20), a directive (PRINT), parameters for that directive ("something something somesuch") and finally a branch from line 20 back to line 10 (20 GOTO 10). What other programming language can offer so much for so little?

Another program favoured by more overachieving rascals was the "time bomb", a simple incrementing counter that they anticipated would eventually "crash" the computer once it hit some arbitrary numerical limit:

```
10 A=0
20 A=A+1
30 PRINT A
40 GOTO 20
```

This was a little more complicated – along with the PRINT directive and the GOTO branch we now have a variable named A and little addition. But alas! It would be quite some time indeed before our little "time bomb" would flummox the computer: in the case of the Commodore 64 you would have to get to 8589934599 before it gave up the ghost – although Integer BASIC on the Apple II retires after only 32767 (it is integer BASIC, after all. No floating-point numbers here! Filthy know-it-all floaters think they're better than us hardworking integers!) Anyway, umm, where was I? Oh yes!

So, by now, these two frivolous little programs have taught you quite a bit, and without having to learn what a "compiler" is, or declaring what type your variables are, or any other redundant nonsense.

And so, the hope of every parent was that once their little shopping-mall vandal actually had a computer, they would use it for good, and not evil. Boy, were they wrong! Buying little Johnny (or Janie) a computer with a BASIC that had a SOUND directive (or some other straightforward means of generating noise) could lead to some rude awakenings at 2AM.

```
10 A=0
20 A=A+1
30 SOUND (A,1)
40 IF A<255 THEN GOTO 20
50 A=A-1
60 SOUND (A,1)
70 IF A>0 THEN GOTO 50
80 GOTO 20
```

Well, at least they were learning! There are conditionals in here! Two IF statements each branch with GOTOs once our siren reaches its crescendo, and again once it hits the bottom. It then restarts its wail, and repeats it ad nauseum. Noisy? Yes. But they wrote code. You have to forgive the little darlings.

If they were economising brats they would soon realise:

```
10 FOR A=1 TO 255
20 SOUND (A,1)
30 NEXT A
40 FOR A=255 TO 1 STEP -1
50 SOUND (A,1)
60 NEXT A
70 GOTO 10
```

saved a little bit of typists shoe-leather. And they would've learned another valuable construct in the form of the FOR-NEXT loops. Huzzah! The cacophony was still annoying, but at least it was educational. They could be outside throwing rocks at possums (or your neighbour's RX-7.) Still happy you bought that computer? Good! You should be. It's only another seven years until they go to university. Your sanity can last at least that long... can't it? You're a great parent, aren't you?

And Then There Was BASIC

Today, BASIC is the world's most popular programming language. Computer languages were invented to allow the human operator to communicate more easily with the machine, and BASIC is one of the easiest to learn and use. It consists of instructions in simple English combined, where necessary, with the mathematical symbols found on a typewriter keyboard.

BASIC is a quick language to master. Within a few minutes of unpacking a microcomputer you can be writing simple programs. It was devised in 1965 at Dartmouth College, New Hampshire, with the express purpose of simplifying existing languages. The inventors were two teachers, Thomas Kurtz and John Kemeny. The universal use of BASIC has meant slight variations in the language have crept in. But the core of BASIC remains common to all manufacturers.

A program is a sequence of instructions which the computer executes to perform a specified task. The task might be to produce a monthly financial forecast, or to move a Space Invader across the television screen. The program appears as a series of numbered lines. Each line contains one instruction and the number allows the computer to obey the commands in the right order. Commands are quickly learnt and even the most complicated program uses nothing more than combinations and repetitions of the elementary commands.

Most computers arrive from the manufacturers with BASIC built in. Computers can also be programmed in 'machine code' (described as 'a low' level language because it is close in structure to the logic found in the electronic circuits). BASIC is a 'high' level language as it is nearer to everyday English. There are many other high level languages devised for more technical and specialised applications, but BASIC is the best introduction to them all. It's a simple and powerful language.

BASIC has taken the mystique out of programming and made computing accessible to everyone

If you think there's an emphasis on kids learning to code now, you either weren't around in the early 1980s, or have forgotten them, because BASIC was everywhere! There were books, and magazines, and even television shows that either in part or in whole taught good old `10 PRINT "HELLO": GOTO 10`

And why not? After all, we were going to need all the computer programmers we could get when we colonised Mars. Those moons of Saturn weren't going to mine themselves, you know! Cloud cities with flying cars and ultrasonic tube-trains under the sea...it was a brave future. What happened to it? Oh yes, reality.

Still, learning to code at least teaches one logic, something sorely needed these days.

`100 END: REM THE END`

Logo: A Better Language for Learning.

Logo (from the Greek *Logos*, meaning word or thought) is a computer programming language invented in 1967. A dialect of LISP (a "functional" language where programming is done using mathematical expressions or declarations instead of directives or statements like BASIC) Logo has a fully featured syntax that allows for a wide range of applications...but, let's face it, the vast majority of Logo's users have never progressed past the turtle.

Not that that's a bad thing! Widely imitated by many of today's "learn-to-code" products, the Logo turtle provided a straightforward, interactive introduction to computer programming similar to BASIC, but more visual and relatable by small children.

Perhaps the most famous version of Logo is Apple Logo, which quickly overtook BASIC as the learning language of choice in North American classrooms in the early 1980s. It essentially turned an Apple II into an electronic Spirograph, and students were entranced by the complexity of the patterns they could draw with just a few simple commands.

There's a web-based version of Logo with examples available here: http://www.calormen.com/jslogo/

Also, Paleotronic's *microM8* emulator features a reimplementation of LOGO that supports 3D turtling, with the additional commands UP, DN, RL (roll left) and RR (roll right).

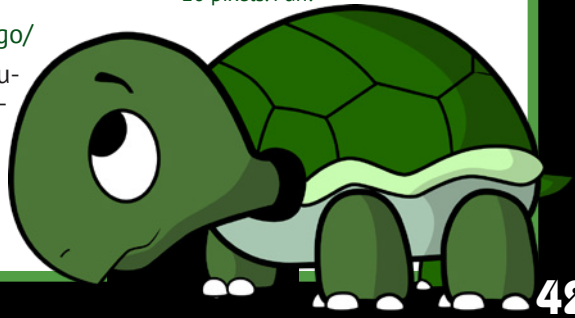
Logo

Logo is a relatively new language becoming popular in education. It has the great advantage of being simple enough for even quite young children to learn. It can help teach programming techniques and also encourages a logical approach to program design from an early stage. Logo uses 'turtle' graphics which allow pictures to be easily produced on the screen.

The Home Computer Course

```
FD 20 RT 90 FD 20
```

The little snippet of LOGO above moves the triangular "turtle" forward 20 pixels, turns it right 90 degrees, and then moves it forward another 20 pixels. Fun!



Bill Gates spruiks Microsoft-developed programming languages for the Apple II (including BASIC) at the 1979 Consumer Electronics Show.

Photo by Tom Munnecke

Microsoft licensed versions of its BASIC interpreter to several computer manufacturers, each with varying degrees of functionality. The worst by far was the one that shipped with the Commodore 64. Not only did Jack Tramiel rush the computer into production, limiting the time available to add architecture-specific graphics and sound commands, but he only paid Microsoft $3 per computer sold. That was not much of an incentive for Microsoft to move quickly, and as a result you can't do much with the in-built BASIC on the C64 beyond `10 PRINT "HELLO"` without excessive use of PEEK and POKE commands, which manipulate memory addresses directly.

APPLESOFT TETRIS

Program written by Mark Stock. Analysis and Annotation by April Ayres-Griffiths

This Tetris listing for the Apple II has a number of interesting features that suggest the author has taken great pains to make the listing as efficient as possible.

Constants vs. Variables

For one thing, rather than using constant values such as "1" or "2" in arithmetic expressions, they have opted instead to use variables. This is a lot more efficient in Applesoft, as using constants requires the parser to convert a string in the listing into a number each time that it is encountered, rather than using a variable which stores the values in a format that is ready to use. You can also see this trick being used with memory addresses, for example the keyboard address is stored in a variable called "KB".

Finding the right line for all occasions

Additionally, subroutines which need to be called frequently (for example the block drawing routines), are towards the top of the program, and less frequently called subroutines (for example game over) are towards the end of the listing. Although this might at first glance seem rather arbitrary, there is a reason for structuring the program this way.

Applesoft programs are stored in memory as a series of statements with a known starting address (typically 2049 in memory). In order to locate a given line of the program (for example if using a GOTO or a GOSUB) then we need to find the right line.

In order to do this, the Applesoft interpreter will start at the beginning, and check each line number. In memory, each line begins with a two byte line number, followed by two bytes which point to the next line numbers address in memory. So to find line 1000, we need to look at each line and if it isn't the correct one, then move to the address of the next line and check that.

This seems like a lot of work, right? The more of the program it has to search through for the right line, the longer each GOTO or GOSUB will take to perform. So we can speed things up a lot by putting things that need to happen frequently, (and quickly) at the start of the program. This makes the game faster as it spends more time doing what we want it to do, and less time trying to find the next line.

Why use code when data will do

The final thing that is interesting about this listing, is that rather than trying to define the various shapes in the game using code, which can become inefficient rather quickly, the author has opted to define the shapes themselves as data statements, which are read into variables.

This makes the program easier to amend in future, should they wish to change the shapes, but also means much more simplified logic can be used in the game. Where possible, let data define the game behaviour rather than hard-coded logic. This is especially true when your program involves multiple different things that follow the exact same rules.

TETRIS

Program Listing

by Mark Stock

This Applesoft BASIC program can be typed into a real Apple II (the preferred experience, although the Apple II's keyboard could quickly become tiresome), or an Apple II emulator such as *microM8* (Mac / Windows) or *AppleWin* (Windows) See download links to the right.

In *microM8* you can choose 'A' from the boot menu to go into Applesoft BASIC. If you use *AppleWin* you will need to boot from a DOS disk image.

Type in the numbered lines from the left-hand colum of each page. The notes in the right-hand column describe what the numbered lines do. **Don't forget to save often!**

```
10  GOSUB 1000

100  W = W + 1 : IF W > LV THEN W = 0 : GOSUB 350

110  K = PEEK( KB ) : IF K >= H THEN POKE KC , H : K = K - H
: GOSUB 300

190  GOTO 100

200  PY = PY * A2 : VLIN PY , PY + A1 AT PX : RETURN

225  PY = PY * A2 : HLIN X1 , X2 AT PY : HLIN X1 , X2 AT PY
+ A1 : RETURN

300  ON E ( K ) GOTO 30000 , 330 , 340 , 350 , 360 , 30100

310  RETURN

330  X = X - 1 : GOTO 400

340  X = X + 1 : GOTO 400

350  DN = 1 : Y = Y + 1 : GOSUB 400 : DN = 0 : RETURN

360  S = S + 1 : IF S / 4 = INT( S / 4 ) THEN S = S - 4

400  GOSUB 500

410  GOSUB 800 : IF F = 0 THEN X = XX : Y = YY : S = SS :
GOSUB 420 : IF DN THEN GOSUB 900

420  COLOR= CF : FOR PP = 1 TO 4 : PX = X + X ( S , PP ) :
PY = Y + Y ( S , PP ) : GOSUB 200 : NEXT PP : XX = X : YY =
Y : SS = S : D = 0 : RETURN

500  IF DD THEN RETURN

510  COLOR= CB : FOR PP = 1 TO 4 : PX = XX + X ( SS , PP )
: PY = YY + Y ( SS , PP ) : GOSUB 200 : NEXT PP : DD = 0 :
RETURN

800  F = 1 : FOR PP = 1 TO 4 : PY = Y + Y ( S , PP ) : ON (
FN PC ( X + X ( S , PP ) ) > 0 ) GOTO 805 : NEXT PP : RETURN

805  F = 0 : RETURN

850  F = 1 : RETURN

900  P = 10 : GOSUB 30300

905  RN = 0 : Y = YM

910  X = XL

920  PY = Y : IF FN PC ( X ) = CB THEN 950

930  X = X + 1 : IF X <= XR THEN 920

940  R ( RN ) = Y : RN = RN + 1

950  Y = Y - 1 : IF Y >= 0 THEN 910

960  IF RN THEN GOSUB 30400

970  Y = 0
```

Apple II emulators:

microM8:	**http://microm8.com**
AppleWin:	**https://github.com/AppleWin/AppleWin/releases**
DOS disk image for AppleWin:	**https://archive.org/download/Apple_DOS_3.3_Master/Apple_DOS_3.3_Master.dsk**

This Tetris clone uses the Apple II's low-resolution graphics mode. In this mode, the Apple II can display a grid of up to 40x48 pixels, each from a palette of 16 colours. You enter the "low-res" mode using the BASIC command GR (for 40x40 pixels with a 4 line text "window" at the bottom) or GR2 for full screen graphics. The TEXT command returns to text mode.

The BASIC command VLIN draws a vertical line (PY) from one horizontal (PX) pixel to another, and HLIN does similarly from one vertical (PY) pixel to another. PLOT "plots" a single pixel at X,Y.

Although it looks like a variable assignment, COLOR= is actually a command! It sets the colour used by PLOT, VLIN or HLIN. Other notable commands in this listing include DEF FN (which defines a mathematical function that can be used over and over), ON X (jumps to one of a series of specified line numbers based on the value of X) and PEEK (which returns the value stored in memory at the specified location). For more information on Applesoft BASIC, see **http://www.calormen.com/jsbasic/reference.html**

Line 10: Call subroutine at line 1000 to initialise game.

Line 100: Increment W by 1, if it is greater than LV move the shape down using subroutine at line 350. LV acts as a delay. The lower LV is, the faster the shapes will fall down the screen.

Line 110: Read keyboard character and based on keypress handle action using subroutine at line 300.

Line 200: Draw square block (1x2) at PX, PY. This is used to draw the tetris shapes.

Line 225: Draw 2 block thick horizontal line between X1 and X2 at position PY.

Line 300: Based on the key pressed, jump to another line. Remember that keys were defined at line 1130.

Line 310: Falls through here if E(K) equals zero.

Line 330: Move shape 1 space left.

Line 340: Move shape 1 space right.

Line 350: Move shape down 1 unit.

Line 360: Rotate shape.

Line 400: Start of shape drawing routine. Calls to 500 to clear previous shape.

Line 410: Call subroutine to see if space is clear. If not we will draw the shape in its previous position.

Line 420: Draw current shape position.

Line 510: Undraw previous shape (draw over previous position and rotation with black pixels). Note, we use XX, YY and SS here which are the previous shape position.

Line 800: Check to see if any space where we are going to draw the shape already has a block there. If so, go to line 805.

Line 805: Set F to zero, then return

Line 850: Set F to one then return

Line 900: Add 10 points to the score.

Line 920: Check if current position is empty (no colored blocks). If true, go to line 950, otherwise continue.

Line 930: Move shape right. If ok, then go to 920 to check if the Y position is empty as well.

Line 950: Move shape up one line. If still on screen then go to line 910.

Line 970: Set shape Y position to zero

```
980  X = INT( ( XR - XL ) / 2 ) + XL
985  S = INT( RND( 1 ) * NS ) : CF = C ( S ) : S = S * 4
990  GOSUB 800 : IF F THEN RETURN
995  GOTO 31000
1000  DIM E ( 127 ) , X ( 27 , 4 ) , Y ( 27 , 4 ) , R ( 40 )
1010  TEXT : HOME : GR
1011  PRINT "WELCOME..."
1014  LM = 10
1015  XM = 10 : YM = 15
1016  XL = INT( ( 40 - XM ) / 2 )
1017  XR = XL + XM - 1
1021  A1 = 1
1022  A2 = 2
1030  DEF FN PC ( X ) = SCRN( X , PY * A2 )
1040  CB = 0
1050  XX = 20 : YY = 0 : SS = 0
1100  KB = -16384
1110  KC = -16368
1120  H = 128
1129  REM KEYBOARD ACTIONS
1130  REM QUIT
1131  E ( ASC( "Q" ) ) = 1
1132  E ( ASC( "Q" ) - 64 ) = 1
1140  REM MOVE LEFT
1141  E ( 8 ) = 2
1142  E ( ASC( "," ) ) = 2
1150  REM MOVE RIGHT
1151  E ( 21 ) = 3
1152  E ( ASC( "." ) ) = 3
1160  REM MOVE DOWN
1161  E ( 32 ) = 4
1162  E ( ASC( "Z" ) ) = 4
1170  REM ROTATE
1171  E ( ASC( "R" ) ) = 5
1172  E ( 13 ) = 5
1173  E ( ASC( "A" ) ) = 5
1179  REM PAUSE GAME
1180  E ( ASC( "P" ) ) = 6
1181  E ( ASC( "P" ) - 64 ) = 6
1185  GOSUB 2000
1186  GOSUB 1300
1190  PRINT "PRESS ANY KEY TO START..."
1191  PRINT
1192  PRINT "PRESS Q TO QUIT."
1193  GOTO 31020
1299  REM DRAW THE GAME
```

Line 980: Set shape X position to half way across play area.

Line 985: Choose a random shape from the shapes available.

Line 990: Check if the shape can be drawn there without colliding with other blocks. If so, return.

Line 995: If we are here, do the "GAME OVER" routine at 31000 as the play area is filled to the top.

Line 1000: Dimension and setup variables. E is used to map keypresses to functions. X and Y store information about the blocks that make up each of the game shapes.

Line 1010: Clear the screen and enter LORES graphics mode.

Line 1011: Display a welcome message.

Line 1015: Define the size of the play area in blocks.

Line 1016: Calculate the left edge of the play area.

Line 1017: Calculate the right edge of the play area.

Line 1021: A1 is used as a constant for speed.

Line 1022: A2 is used as a constant for speed. Each horizonatal line or block is 2 pixels high.

Line 1030: Define a function to read the pixel color at position X, PY

Line 1040: Define background color (0) which is black. This represents empty space in the play area.

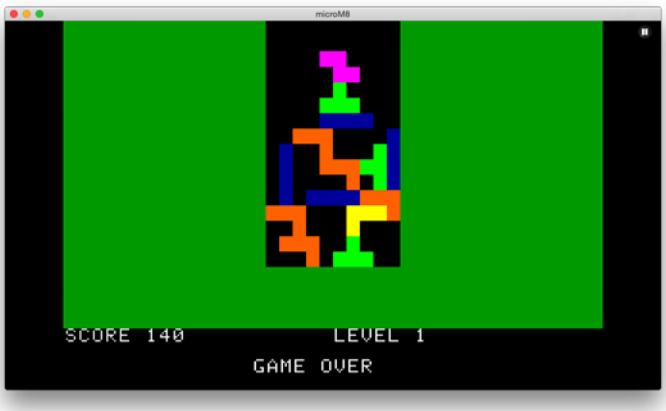
Line 1050: XX is Previous shape X, YY is Previous shape Y and SS is previous shape pointer.

Line 1100: KB is defined as a constant used for the address of the Apple II keyboard buffer.

Line 1110: KC is defined as a constant used for the address of the Apple II key strobe.

Line 1120: H is defined as 128, it us used to check for new keypresses at address KB. If a new press, it will be bigger than 128.

Lines 1130 - 1181: Define keymappings between the ASCII keycode and a function number (1-6). These are used to handle actions during the game.



Line 1185: Call subroutine to load share data from DATA statements.

Line 1186: Call subroutine to draw play area outside.

Lines 1190 - 1193: Display instructions for starting and quitting the game, and jump to keyboard reading subroutine.

```
1300  COLOR= 4 : FOR I = 0 TO 19 : X1 = 0 : X2 = 39 : PY = I
: GOSUB 225 : NEXT

1320  COLOR= CB : FOR I = 0 TO YM : X1 = XL : X2 = XR : PY =
I : GOSUB 225 : NEXT

1350  RETURN

1400  DATA 1

1401  DATA 0,0,1,0,0,1,1,1

1402  DATA 0,0,1,0,0,1,1,1

1403  DATA 0,0,1,0,0,1,1,1

1404  DATA 0,0,1,0,0,1,1,1

1410  DATA 2

1411  DATA 0,1,1,1,2,1,3,1

1412  DATA 1,0,1,1,1,2,1,3

1413  DATA 0,1,1,1,2,1,3,1

1414  DATA 1,0,1,1,1,2,1,3

1420  DATA 12

1421  DATA 1,1,0,1,1,0,2,1

1422  DATA 1,1,0,1,1,0,1,2

1423  DATA 1,1,0,1,2,1,1,2

1424  DATA 1,1,1,0,2,1,1,2

1430  DATA 13

1431  DATA 1,1,0,1,2,1,0,2

1432  DATA 1,1,1,0,1,2,2,2

1433  DATA 1,1,0,1,2,1,2,0

1434  DATA 1,1,1,0,1,2,0,0

1440  DATA 9

1441  DATA 1,1,0,1,2,1,2,2

1442  DATA 1,1,1,0,1,2,2,0

1443  DATA 1,1,0,1,2,1,0,0

1444  DATA 1,1,1,0,1,2,0,2

1450  DATA 3

1451  DATA 1,1,1,0,0,0,2,1

1452  DATA 1,1,1,0,0,1,0,2

1453  DATA 1,1,1,0,0,0,2,1

1454  DATA 1,1,1,0,0,1,0,2

1460  DATA 6

1461  DATA 1,1,0,1,1,0,2,0

1462  DATA 1,1,0,1,0,0,1,2

1463  DATA 1,1,0,1,1,0,2,0

1464  DATA 1,1,0,1,0,0,1,2

1990  DATA -1

2000  X = 0 : Y = 0

2010  NS = 0

2020  READ C : IF C <> -1 THEN C ( NS ) = C : FOR J = 0 TO 3
: FOR I = 1 TO 4 : READ X ( NS * 4 + J , I ) : READ Y ( NS *
4 + J , I ) : NEXT I : NEXT J : NS = NS + 1 : GOTO 2020

2030  RETURN

21210  P = 1 : RETURN
```

Lines 1300 - 1350: Draw the game screen. First fill with green, then draw the play area in black.

Lines 1400 - 1990: This holds the shape data for each type of shape.

First is the shape color, then follows 4 versions of the shape, each rotated 90 degrees. Each contains 4 (X, Y) pairs.

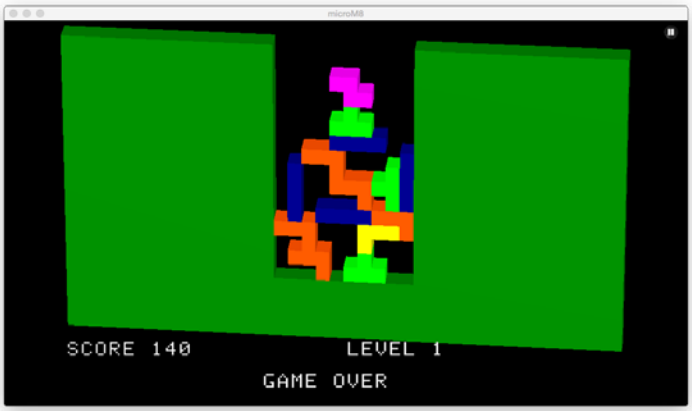
Line 1410: Shape 2 color

Line 1411: Shape 2 first rotations (X, Y pairs)

Line 1412: Shape 2 second rotation (X, Y pairs)

Line 1413: Shape 2 third rotation (X, Y pairs)

Line 1414: Shape 2 forth rotation (X, Y pairs)



In microM8 you can play your new Tetris game in 3D! Once the game starts, pause microM8 by pressing Control-Shift-Space. Then you can move the "camera" by using the following key combinations:

- **Hold Shift-Control-Alt/Option and press the arrow keys to "orbit" around the model.**
- **Hold Control-Alt/Option and press the arrow keys to move the model.**
- **Hold Shift-Alt/Option and press the up or down arrow keys to zoom in and out.**
- **Hold Shift-Alt/Option and press the left or right arrow keys to rotate the model**

This trick works with any game you play in microM8 (although in high resolution programs you may need to turn on 3D rendering by pressing Shift-Control-G, releasing it and quickly pressing the number 2.)

You can download microM8 from *http://microM8.com*

Line 1990: -1 signals end of data.

Line 2000: Reset X and Y to zero.

Line 2010: NS (Number of shapes) set to zero.

Line 2020: Read in shape data using the format described above (see line 1410).

```
30000  TEXT : HOME : END

30100  HOME

30110  PRINT “GAME PAUSED.  PRESS P TO CONTINUE...”

30120  P = 1

30130  K = PEEK( KB ) : IF K >= H THEN POKE KC , H : K = K -
H : GOSUB 30200

30140  IF P THEN 30130

30150  HOME

30160  PRINT “SCORE “ ; SC ; TAB( 21 ) ; “LEVEL “ ; LM - LV
+ 1

30170  RETURN

30200  ON E ( K ) GOTO 30000 , 30210 , 30210 , 30210 , 30210
, 30220

30210  RETURN

30220  P = 0

30230  RETURN

30300  SC = SC + P

30310  VTAB 21 : HTAB 7

30320  PRINT SC ;

30330  RETURN

30400  RN = RN - 1

30410  FOR C = 0 TO 32

30415  COLOR= C

30420  FOR I = 0 TO RN : X1 = XL : X2 = XR : PY = R ( I ) :
GOSUB 225 : NEXT I

30430  FOR I = 0 TO 2 : NEXT I

30440  NEXT C

30450  FOR I = 0 TO RN

30460  Y = R ( I ) + I

30470  YP = Y - 1 : FOR X = XL TO XR : PY = YP : COLOR= FN
PC ( X ) : PX = X : PY = Y : GOSUB 200 : NEXT X : Y = Y - 1
: IF Y > 0 THEN 30470

30480  P = 100 : GOSUB 30300

30490  NEXT I

30495  RETURN

31000  VTAB 22 : PRINT

31010  PRINT “              GAME OVER”

31020  P = 1

31030  K = PEEK( KB ) : IF K >= H THEN POKE KC , H : K = K -
H : GOSUB 31200

31040  IF P THEN 31030

31050  D = 1

31060  SC = 0 : LV = LM

31070  GOSUB 30150

31080  GOSUB 1300

31090  GOTO 905

31200  ON E ( K ) GOTO 30000

31210  P = 0 : RETURN

32000 REM END OF LISTING
```

Line 30000: Clear the screen into text mode and end the program.

Line 30100: Clear screen and display pause message.

Line 30130: Read the keyboard. If a key is pressed call subroutine at 30200.

Lines 30150 - 30160: Refresh the score on the screen.

Line 30200: Based on keypress and mapping in array E, call an appropriate subroutine.

Lines 30300 - 30330: Update the score by adding P to it and redisplay it on the screen.

Lines 30400 - 30440: Flash horizontal lines on the screen.

Line 30450-30490: Remove completed lines from the screen.

Lines 31000-31010: Display “GAME OVER” message.

Line 31030: Read keyboard. If a key has been pressed call subroutine at line 31200 to handle.

Line 31060: Reset score and level (speed).

Line 31080: Call subroutine to redraw the game screen.

Line 31090: Continue game.

Line 31200: If a valid key has been pressed, jump to line 30000

Line 32000: This is the end! Type RUN and cross your fingers...

Women in Technology

In this recurring series, Paleotronic hopes to highlight the ongoing role women have played in the history of electronics and digital technologies.

We're going to begin our series with a brief look at the story of Lore Harp and Carole Ely, and the Vector 1, one of the world's early microcomputers.

Bored with the suburban Californian lifestyle of the 1970s, Lore Harp, a recent German immigrant felt that she needed something more productive to do than simply being the housewife of her American husband Robert, a senior scientist for Hughes Research Labs in Malibu, and taking care of their two daughters.

One of Lore's neighbours, Carole Ely felt the same, finding it difficult to settle down into a sedentary lifestyle after having worked for investment firms on the US east coast such as Merrill Lynch. Carole was determined to get back into the business world, and she and Lore brainstormed ideas for starting a new business, first considering a travel agency (which was quickly established not to be viable).

However, the appearance of the first hobbyist computer, the Altair 8800 in 1975, would soon provide an opportunity for the duo. Lore's husband Robert ordered an Altair, but after it arrived he was unimpressed with the design of its memory board, and built his own. Robert thought there might be a commercial opportunity in his replacement board, but didn't have the time to pursue it, putting his entrepreneurial aspirations to the side.

When his wife made her own ambitious intentions clear a year later, Robert realised that his memory board could be a potentially lucrative first product for Lore and Carole's new business.

The women were initially uncertain about the market for Robert's pet project, but after he took them to a local computer fair, they realised that they could easily compete with the poorly designed, overpriced products that other vendors in the microcomputing niche were offering, and they created a new company during the summer of 1976.

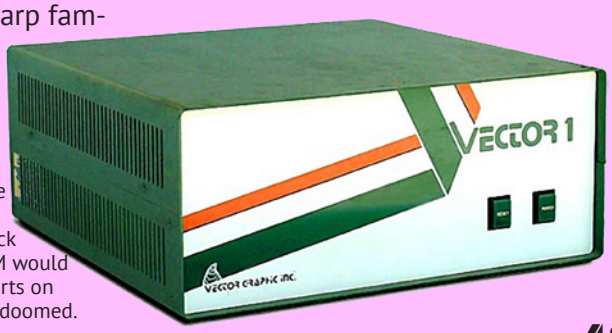
Robert suggested they name it Vector Graphic after another project he had in the works for a video board (which never eventuated), but other than that, he left the running of the new company to Lore and Carole. Lore became Vector Graphic's CEO, and Carole managed media and marketing.

Starting with $6000, they saw an opportunity selling Robert's memory board by mail order, advertising in magazines. The whole Harp family took part in assembling the first boards they sold, with the business taking over the house.

Over time, Robert designed other Altair boards, eventually replacing virtually all of its functionality, and leading him to design his own mainboard to connect them all together. The Altair completely expunged, Vector Graphics decided to sell its own computer, dubbing it the Vector 1.

Launched in 1977 at the same computer fair as the Apple II, the Vector 1 came in a stylish case, painted either green or orange. Lore and Carole would successfully build rapport with a worldwide network of dealers, and the computer sold extremely well to small businesses. However, the era of the PC would soon displace the microcomputer, and Vector Graphics would see several ups and downs before eventually losing its market entirely to IBM.

Vector closed its doors in 1986.



Carole and Lore would grow Robert's hobby projects into a multi-million dollar computing powerhouse that dominated the small systems market in the late 1970s. Lore would become the first female founder to take her company public on the New York Stock Exchange. But 800-pound-gorilla IBM would soon decide to concentrate their efforts on her market, and Vector Graphics was doomed.

the PRO shop

electronics and professionals

Marty's camera in Back to the Future is one cool piece of gear, but his JVC GR-C1 VideoMovie was actually over four years old at this point – an early version of it had been demonstrated at the Consumer Electronics Show in 1981.

A video camera with an in-built recorder was revolutionary for the early 1980s. Up until then, you needed an external recorder for your so-called portable video camera. Many of these recorders didn't have batteries, which severely limited your mobility. And the ones that did were heavy! Many videographers found themselves slinging the video recorders and batteries over their shoulder, bouncing against their hips as they ran down the street trying to get the perfect shot of parades or protests, leading to all sorts of workplace injuries. Not cool! There had to be a better way, and video camera manufacturers, including JVC, set out to find it.

Firstly, JVC realised that using full-sized VHS tapes in an "integrated" camera and recorder was going to bulk up their new "camcorder" significantly. Engineers found a solution – use smaller tapes! However, there were concerns over compatibility. In order to transfer their video to their home VCR, would consumers have to play it back over composite cable? That would be a very poor user experience. What to do?

JVC designed their new smaller "compact VHS" (or VHS-C) tape so that it would fit into a larger VHS tape "shell". This "rebigginator" tape could then be placed into a standard VCR and played back, allowing for quick editing. Improvements in battery technology, and the ongoing miniaturisation of electronic components combined with VHS-C to allow JVC to release the VideoMovie to the public in 1984, and the era of the home movie had begun – so had the era of crowd-sourced news video, and professional news videographers found themselves adding a camcorder or two to their kit, for when they really needed mobility free of wires and cumbersome equipment. Gone were the days of hip and back injuries!

Above: This clumsy combo doesn't even have a battery. It's also black and white!

Below: A much better solution, the GR-C1.

VHS-C would get an upgrade in the late 1980s. S-VHS-C (or Compact Super VHS) which had 60% increased video bandwidth, providing a horizontal resolution higher than NTSC broadcast television. However, by that time Sony's Betacam format had become the industry standard, and S-VHS-C did not see any real uptake by professional videographers.

CAMCORDERS

The hottest thing in broadcast equipment this year is a combination camera/VCR, sometimes called the "camcorder," and the recent National Association of Broadcasters equipment show was dominated by enough of them to spur a call for standardization. All of the camcorders are built around new video-recording systems using consumer videocassettes and broadcast-quality cameras. Many of the new units use the standard VHS quarter-inch cassette, but speeded up to produce a picture of breathtaking quality though limiting recording time to 20 minutes per cassette. RCA and Panasonic worked jointly on that system; RCA calls its camcorder *Hawkeye*, while Panasonic uses the tradename *Recam*. Hitachi and Ikegami also showed combinations using the same system.

Sony's camcorder, *Betacam*, uses a standard Beta cassette, however; again, recording time is 20 minutes. The newest camcorders use the little quarter-inch Funai *CVC* cassette that is used in Technicolor's portable VCR. To improve the picture quality, those camcorders also speed the cassette up, resulting in recording times of from 8 to 15 minutes per quarter-inch cassette. Camcorders using the *CVC* cassette—all incompatible—were shown by Hitachi, Ikegami, and Bosch Fernseh. The Hitachi unit and one by Nippon TV Network used three solid-state MOS image sensors in place of pickup tubes. Hitachi and Ikegami gave prospective customers the choice of quarter-inch and half-inch cassette systems. RCA and Panasonic, meanwhile, have requested that a camcorder VCR standard be established using their VHS-cassette format.

Radio Electronics, February 1983

Betacam found much greater success than its sister Betamax format. Introduced in 1975, Betamax soon faced stiff competition from VHS. Unlike Betamax, VHS players were made by several manufacturers, making them much cheaper. VHS tapes were also longer.

Speaking of the Sony Betacam...

Sony wasn't sitting still in its ongoing battle with rival JVC. In 1982 they released their own video camera format, Betacam. While the tapes were the same ones used in Betamax VCRs, and despite the fact the video recorders in early Betacam camcorders couldn't play back what they recorded, the video standard was broadcast quality, and that held obvious appeal for television stations and their videographers.

After Betacam SP, with more robust tapes and increased recording times, was introduced in the mid-1980s, U-Matic was completely abandoned by broadcasters. 1993 saw the introduction of Digi-Beta, a digital format, however Digi-Beta equipment was not backward-compatible with the analog Betacam SP and was not immediately popular with newsgathering organisations, who had huge back-catalogs of footage they could not readily afford to transfer.

The solution was Betacam SX, a digital version of Betacam SP that stored MPEG2-encoded video (similar to the encoding used on DVDs) on ordinary Betacam SP tapes. Betacam SX equipment could be used with both digital and analog SP recordings, allowing archival footage to be mixed in with new footage easily. Although Betacam SP equipment has long since gone out of production, many news organisations continued to use the format well into the 2010s.

Family History

To fully appreciate the Model 200, a layman's understanding of the Model 100 is in order. Briefly, the Model 100 is a notebook-sized portable computer with a 40-column by 8-line liquid crystal display (LCD) and a built-in 300 baud modem. The computer can be equipped with 8 to 32K of RAM and has several useful programs residing in ROM. One of the most appealing points of the Model 100 is that there is effectively no operating system, thus making it a very friendly machine for even a novice to operate. All of these features combine to make the Tandy Model 100 the most successful portable lap-sized computer to date—admittedly a tough act to follow. Enter the Model 200.

As the name implies, the Model 200 is an enhanced version of its predecessor. Major differences include a 40-column by 16-line flip-up display, 24K to 72K of RAM, 72K to 104K of ROM, improved cursor key cluster, and the *Multiplan* spreadsheet in ROM.

Creative Computing, March 1985

News broadcasters weren't the only journalists who benefitted from the technological advances of the early 1980s. Print journalists wholeheartedly embraced Tandy's Model 100 after its introduction in 1983. Its small size combined with a proper keyboard and long operating periods from standard AA batteries made the portable computer perfect for writing on-the-go – it even had a built-in modem so you could file your report as soon as you were done. Its 8-line 40-column LCD screen was sufficient for the task. It just did the job. Over six million Model 100s were sold worldwide.

In 1985, Tandy unveiled the Model 100's successor, the Model 200 at the Consumer Electronics Show. Sporting a flip-up screen with twice the real-estate, arrow keys and a built-in spreadsheet, Tandy was sure it was going to be a hit – but journalists criticised it for having the same 40-column display at a time when 80 column was becoming increasingly common.

They were also unhappy with the lack of a 3.5 inch floppy disk drive and limited 24 kilobytes of memory. Tandy would fix all of these issues in the Model 600, but even that did not sell as well as the Model 100, which Tandy re-released with less weight and more memory in 1986 as the Model 102.

You will have a hard time finding a laptop with a full-sized keyboard that can run for 20 hours without recharging even today. Sure, modern notebook computers have more features, but at what cost?

CYCLE CIRCUIT

You've heard of people who peddle their goods. Well, here's an example that might make you blow a circuit.

Steve Roberts, 31, of Columbus, Ohio, wanted to find out how computers are changing the way we live. So he strapped his Tandy Model 100 computer and modem onto an 8-foot-long bicycle and started pedaling across America.

As he cycles cross-country, Steve stays with friends he has met through the CompuServe computer network. He also uses the network to communicate with other computer users. The trip, which may take two years to complete, is part of Steve's research for a book he's writing. The title? *Computing Across America*, of course.

Enter, October 1984

ATZ NO CARRIER

NETWORKING AND TELECOMMUNICATIONS

COMMODORE EDITION

The first modem to cost under US$100, the VICModem brought the world of telecommunications to many more computer users.

Commodore Introduces Lowest Priced Modem In The Computer Industry

Valley Forge, PA, January 7, 1982 – A low priced modem has been introduced by Commodore Business Machines, Inc.

The new "VICMODEM," which retails for $109.95, is an easy-to-use plug-in cartridge that connects directly to the user port of Commodore's VIC 20™ home computer, and may be used with any modular style telephone.

The VICMODEM, which is planned for retail sale in the Spring of 1982, allows users to communicate and exchange data with other computer owners over the telephone. This latest VIC peripheral also allows users to inexpensively access telecomputing networks such as the Source™ or Compuserve™, which provide services such as stock quotes and company reports, newswire stories, research data, sports scores, airline reservations, shopping services and more.

The VICMODEM is a direct connect, 300 baud modem with originate/answer and half/full duplex capabilities. The combined cost of the VIC 20 and a VICMODEM is less than $410.00.

Compute! March 1982

Introduced at 1982's Winter Consumer Electronics Show, the VICModem was the product of six months of frenzied development. Michael Tomczyk, the Commodore executive responsible for managing the development and manufacture of the VIC-20, wanted his new computer to have a low-cost telecomputing option, in part because Tomczyk wanted to provide technical support through CompuServe, a national on-line service (a precursor to the Internet.) Other manufacturers' modems (MOdulator-DEModulator, referring to the way it transferred data) were very expensive – the cheapest was over US$400 1981 dollars!

Commodore's engineers were too busy to take on the project, so Tomczyk contacted an outside company, but they were unable to come up with a design that could be manufactured at a low enough price.

At the 1981 Winter Consumer Electronics Show, the outside company's engineers caught Tomczyk outside his hotel room door, apologising for the cost of their modem and attempting to explain the reasoning for it. Tomczyk pointed out that the VIC-20's "user port" (an edge-connector that allowed external peripherals to connect directly to microchips inside the computer) had lines that led to an RS-232 communications interface (that could be interacted

SCIENCE FICTION IS NOW REALITY

Science fiction writers used to speculate that one day we'd be able to use "electronic libraries" in our home or office - the technology has been here for several years - but it took the low-priced VIC-20 and VICMODEM to make this service affordable... and turn science fiction into reality.

Your Commodore computer gives you tomorrow's world of electronic communications... today. By allowing you to connect your computer to a telephone, your VICMODEM puts you in touch with incredible information services like "CompuServe", "The Source", "Dow Jones", and other computer networks.

The first version of the VICModem was so no-frills you had to type in a terminal program out of the user manual in order to use it! It also couldn't dial phone numbers on its own - you had to dial the number manually using a telephone, then unplug the telephone and plug the modem into the wall socket. The number of calls missed by those who forgot to plug their phone back in we can only speculate, but was probably not a small number. The VICModem placed downward price pressure on the modem market in general, and telecomputing eventually became more affordable for users of other computers as well.

Released in 1980, the VIC-20 was the world's first low-cost computer, at a list price of under US$300. Compared to other computers of the time, the VIC-20 had a tiny memory (5 kilobytes) and an odd 22-column-wide text display (because its video processor was a re-purposed video-game chip) but its affordability made home computing available to many for the first time.

The VIC-20 would sell over 800,000 units in 1982, making it the top-selling computer of the year. However, the introduction of the Commodore 64 would cause sales of the VIC-20 to fall by mid-1983, and it would be heavily discounted, costing under $US90 before it was discontinued in 1985.

with by software programs) and so all the engineers needed to do was build a "cartridge" that modulated the data to and from a telephone line – a much simpler method of solving the problem than the engineers had previously devised, which likely involved connecting through the VIC-20's I/O port, and would have needed additional circuitry.

They agreed that Tomczyk's solution was feasible, and went to work. The finished product couldn't even dial a phone number (this had to be done manually) but it worked and it was cheap! In March 1982 the VICModem was delivered for sale, and became the first modem to sell over a million units.

Tomczyk developed a user community called the Commodore Information Network on CompuServe where users assisted each other with their computer problems. It became so popular, CompuServe paid Commodore several tens of thousands of dollars for all the user traffic they were generating.

And so, thanks to the VICModem, over a million VIC-20 users gained the ability to call on-line services and bulletin-board systems, a privilege previously reserved for owners of expensive computers and telecommunications equipment.

CompuServe, founded in 1969, initially rented time on its mainframe PDP-10 computer systems. In 1978, it started MicroNet, an information service for residential customers – it was successful and renamed Compuserve when the company opted to make it its core business.

Tele/Scope

The VICMODEM brings mainframe computing home.

by Jeff Hand

Computer networks were once only an idea in a science fiction writer's mind. But science fiction is becoming reality quicker than you may think. Imagine, for instance, having access to tremendous amounts of information, almost unlimited memory and the programming ability of a mainframe right in your home.

That kind of power is available right now to home computerists, who can use a modem and a telephone to link their small computers to big mainframe computers. Tying into computer networks via telephone is called telecommunications—which is the subject of this column.

The VIC 20 and the VICMODEM cartridge can be your keys to the vast empire of telecommunications. A modem converts (MOdulates) a computer's signals so they can be sent over telephone lines, then translates them back to signals the computer can understand (DEModulates).

and beyond

With the VICMODEM, available from Commodore, you can communicate over the phone with computer networks across the nation—from huge mainframes to someone else's personal computer.

With the VICMODEM, the capabilities of your VIC 20 are magnified and enhanced. The applications are only as limited as your imagination. You can program in several computer languages—COBOL, FORTRAN, PASCAL and BASIC—and various assembler languages, for instance.

In addition, subscription telecommunications networks such as CompuServe and The Source have data banks that include scientific information, newswire stories, newspapers from across the country, numerous programs, stock quotes, financial advice and various computer utilities. Not only that, but you and your computer can play a good game of bridge or backgammon quickly and inexpensively over the phone.

What, specifically, can **you** do with the help of a VICMODEM?

Businessmen—The VIC 20 and VICMODEM allow you to get current stock quotations and company reports. You can use one of many business programs for accounting, statistics, data management, letters and contracts. Store information and update it at any time. A back-up copy of all information you enter into the system is maintained, so no data can be lost.

Students—In school it's virtually impossible to get enough time on the computer terminal. With the VIC 20 and VICMODEM you can work conveniently at home—and forget about the mobs at the terminals—by tying into the school computer. Or suppose you have an assignment to write a paper on current American foreign policy in Central America. You simply hook up the VICMODEM to your VIC 20 and call a service like The Source or CompuServe. Online you access the UPI service and several editorials from various national papers to gather your information. To make your task even easier, you can use the VIC word processing capability to print the report on your VIC printer.

You're a step ahead of your peers and it was less work!

Farmers—Use a computer network like Agnet to stay informed on the latest market prices for your produce. Get up-to-the-minute weather reports, programs for soil analysis and scores of helpful farming tips on a range of subjects from birthing a calf to exterminating moles.

Shoppers—Shopping for durable merchandise is easy on a computer network like CompuServe. You don't have to leave home, and the service is available 24 hours a day. You do all your research, pricing and comparison shopping right on the computer. Your account is billed for any purchase you make, and merchandise is delivered right to your door.

CBer's—CBing on the computer is the next best thing to being there, and can be cheaper than a phone call. Since you can converse with more than one person at a time, you can even hold a conference with friends from around the country.

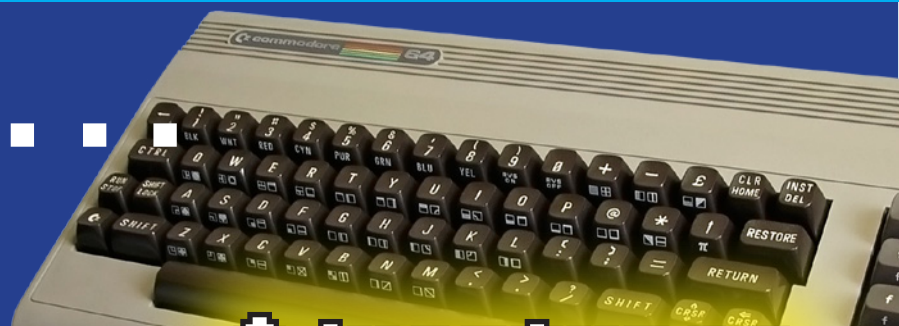
Commodore VICMODEM

Commodore, besides its storm of new computers, also was showing off its VICMODEM. This is a very un-modem-looking modem, a cartridge that plugs into the VIC-20 and connects it directly to modular telephones (without the familiar acoustic coupler cups). This allows the VIC, among other things, to communicate with distant computers – yes, even mainframes – and to access computing services such as CompuServe, The Source, General Videotex, and the Dow Jones News/Retrieval Service. In fact, purchase of the VICMODEM includes free membership with CompuServe and free sample access time to all these services, including the Commodore Information Network, part of CompuServe. The VICMODEM also comes with its own terminal software (necessary for running a modem), called VICTERM 1. Best of all, the whole package will sell for $109.95.

Compute! August 1982

The VICModem came with US$200 worth of vouchers for CompuServe, The Source (a competitor) and Dow Jones stock market information. That may seem like a lot, but these services charged by the minute, and you could really rack up a large bill, prompting some CompuServe users to nickname the service "Compu$pend".

LOADING..
READY.
RUN.



Adventures in early computing!

A fish-eye view of the 1982 Consumer Electronics Show (Creative Computing, May 1982)

COMMODORE NEWS

Powerful-Versatile COMMODORE-64 Computer Ideal for Home and Business Applications

The Commodore-64, one of Commodore's newest breakthroughs in adding versatility and power to home and business microcomputing, was unveiled at the Summer Consumer Electronics Show in Chicago and The National Computer Conference in Houston.

The Commodore-64, which Shearson/American Express said "could be the microcomputer industry's outstanding new product introduction since the birth of the industry," gives home and business users powerful 64K computing capability along with exciting three-dimensional-style color game graphics and music synthesis. At the suggested retail price of $595.00, the Commodore-64 offers one-third more computing power than the Apple II+® at less than one-half its suggested retail price.

Physically resembling Commodore's popular VIC 20 computer, the Commodore-64 can use VIC 20 peripherals, and goes far beyond the VIC's capabilities. With the addition of a cassette interface, the Commodore-64 can use many programs and files created for Commodore's sophisticated line of PET and CBM education- and business-oriented computers. And with the addition of an IEEE-488 cartridge, the Commodore-64 can run any Commodore peripheral, including a dual disk drive and a CBM printer.

For those programs that need conversion, the Commodore-64 has a PET emulator that makes it operate like a PET in most areas. One of its most impressive features is its ability to use a Z80 cartridge to run CP/M®, giving users access to one of the largest collections of microcomputer software available.

Computerists can use the Commodore-64's versatility to synthesize music and play all the exciting games designed for the new Commodore MAX Machine. Its 40 column x 25 line screen and 16 colors give it great flexibility for users to create their own graphics characters and games. And its 64K Random Access memory (RAM) gives it the capability for sophisticated home and business applications. Word processing programs will be available for the Commodore-64, along with Commodore's own new "electronic spreadsheet". Many new applications will be on the market soon.

The Commodore-64 relies on state-of-the-art integrated circuits designed and produced by Commodore's subsidiary, MOS Technology. The heart of the Commodore-64 system is a new microprocessor, the 6510. The 6510 is similar to the MOS 6502—the chip that made microcomputing a household occupation—but contains additional input/output (I/O) lines to handle the processing required by the new system.

Apple II+ is a registered trademark of Apple Computer, Inc.
CP/M is a registered trademark of Digital Research, Inc.

The Commodore 64, introduced at the 1982 Winter Consumer Electronics Show, was a significant improvement on the VIC-20, and would become the best-selling computer model of all time.

In early 1981, Commodore-subsidiary MOS Technology began work on graphics and sound chips for a next-generation video-game console called the Ultimax, thinking that was where the company's future lay. However, after the chips were completed, several Commodore engineers disagreed with the project's direction, insisting that the company should instead develop a successor to the VIC-20, Commodore's low-cost computer, not a console.

Commodore CEO Jack Tramiel opted to go ahead with both projects, however he insisted the computer come with 64 kilobytes of RAM in order to make business applications more practical than they were on the memory-starved VIC-20. The new project was dubbed the VIC-40 but renamed the C64 in

The Commodore 64's 40-column screen was much easier to read than the VIC-20's. The VIC-II chip supported 320x200 monochrome and 160x200 multi-colour video modes, 16 colours and could manage 8 24x21 (or 12x21 colour) pixel sprites, – independent graphics objects – and detect collisions between them.

The SID (Sound Interface Device) audio chip featured three oscillators that could choose from four different waveforms (sawtooth, pulse, triangle and noise.) It also had a hardware frequency filter and ADSR (attack, delay, sustain, release) volume envelopes and was very advanced for its time.

The addition of 64 kilobytes of RAM also made more sophisticated, memory-intensive programs such as word processors and spreadsheets possible.

> The Commodore 64 is an interesting hybrid, designed for versatility. It can use VIC 20 peripherals, and runs many programs and files written for PET and CBM computers. With the addition of an IEEE-488 cartridge, the Commodore 64 can run other Commodore peripherals, including CBM disk drives and printers. A PET emulator makes it operate like a PET in many respects, and a Z-80 add-on processor board turns the Commodore 64 into a CP/M machine. The basic configuration costs $595.
>
> Microcomputing, September 1982

The press were generally pleased with the low cost of the Commodore 64 – its US$595 price tag was significantly lower than its competitors, and like the VIC-20 opened up the home computer market to more consumers.

Its low cost would help make the Commodore 64 the world's most popular 8-bit computer model.

Chip Off The Old Block

The secret behind the Commodore 64's advanced features, yet extensive compatibility with earlier technology, is a new microprocessor chip for its Central Processing Unit (CPU). Instead of the 6502 chip in earlier Commodores, the 64 has a 6510 designed by MOS Technology, the same Commodore subsidiary which designed the 6502. The 6510 has additional input/output lines, but is still, like the 6502, an eight-bit chip. Moreover, it shares the 6502's instruction set. This means machine language programmers will adapt quickly to the new chip.

The Sound Of Music

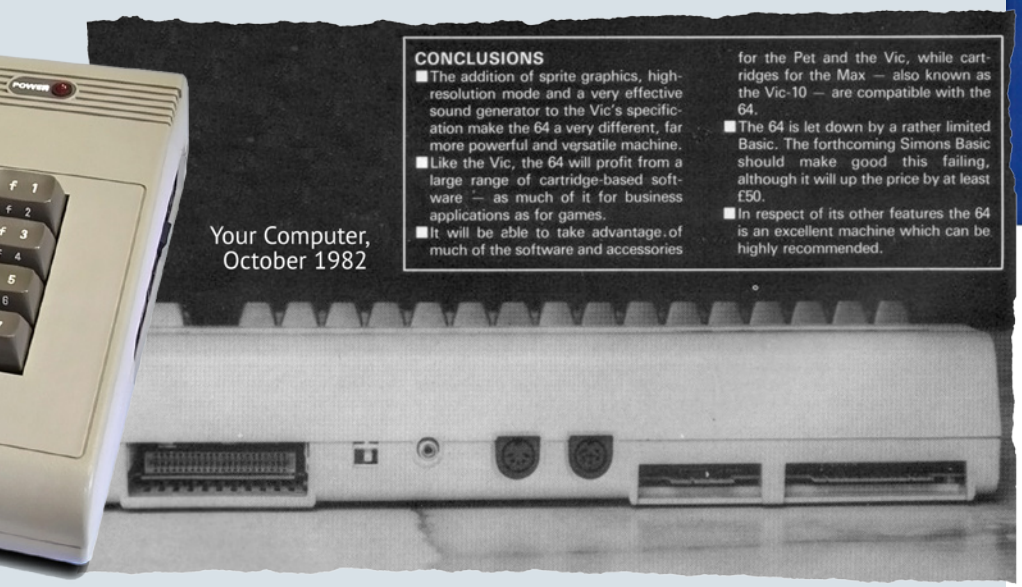
No doubt about it: the new Commodores with the SID chip have the most sophisticated sound capabilities of any home/personal computers on the market. Skeptical? You won't be after you hear them. For one thing, the SID chip is much more than the tone generators found in other computers It is a true sound synthesizer with an envelope generator for each of its three voices, programmable attack, decay, sustain, and release for each voice, plus a choice of four waveforms, plus programmable high-, low-, band-, and notch-pass filters, plus 16-bit frequency resolution over a nine-octave range from 0-4 KHz, and even variable resonance and a master volume control.

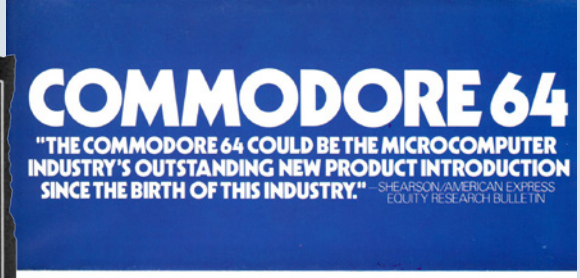
Add Sprite To Your Life

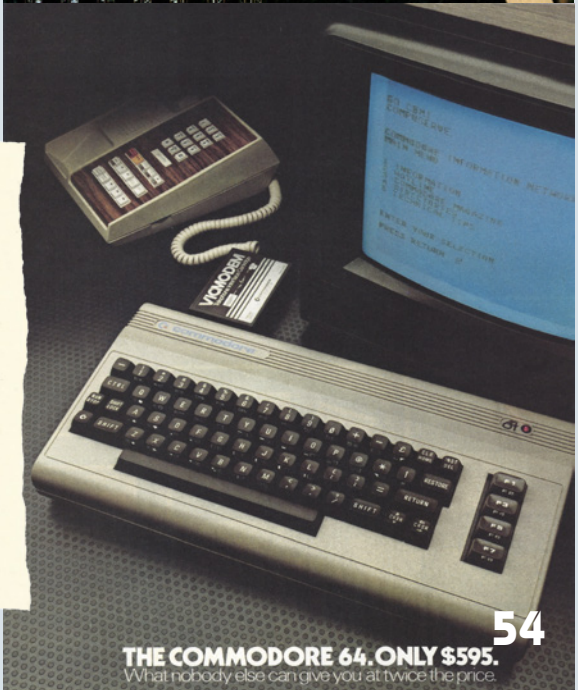
The standout feature of the Commodore 64's graphics is the ability to manipulate sprites. Until now, the only home computers capable of displaying sprites were the Atari 400/800 and Texas Instruments TI-99/4A. All you Commodore loyalists who used to flip by articles on Atari player/missile graphics will have to learn what it's like to struggle with this new concept in computer animation. Luckily, you'll probably have it easier than Atari people, since the new Commodores use sprites even more powerfully than the Ataris.

Compute!'s August 1982 edition raved over the advanced new features of the Commodore 64, including its cutting-edge graphics and sound functionality.

The 64's SID (Sound Interface Device) gave the computer the ability to generate synthesised sound that rivalled expensive professional synthesisers from its era. The SID included hardware "filters" that could affect the sound quality in various ways, including vibrato and frequency "sweeps" (common now in today's EDM.)







time for CES. The Commodore 64's retail price was set at US$595, which was a substantial savings over other computer models available at the time. Commodore could afford to undercut its competitors as it was its own supplier for many of the 64's components – MOS Technology manufactured the microchips as well as designing them –including the 6510 CPU (central processing unit). Because of this, it only cost Commodore an estimated US$135 to manufacture a 64.

Even at such a low price sales of the 64 were initially slow. Software publishers were not given any advanced access to the computer, and without backward compatibility with the VIC-20, the 64's software catalogue was quite minimal. However, by mid-1983 a large quantity of software titles began to appear, and that, combined with a cut in the 64's retail price to just US$300, caused the public to embrace it with gusto.

These sales were helped by Commodore's arrangements with department and discount stores such as KMart, who sold the 64 through their electronics departments, a non-traditional sales channel for computers at that time. This put it in competition with contemporary video-game consoles which were largely technologically inferior, and the potential for productivity applications made the 64 an attractive choice for parents, especially after the 1983 video-game crash.

In fact, Commodore offered a $100 rebate to anyone who traded in a rival computer or video-game system, arguably contributing to the circumstances that led to the crash, and cementing home computers as the successors to video-game consoles until the late 1980s, when Nintendo would take back the crown. In the meantime the 64 would sell two million units for each of the years 1983 to 1986.

The Commodore 64 would get a facelift in 1986 with the 64C, a re-packaging that brought its exterior design in line with its successor, the Commodore 128. In total, there were over ten million Commodore 64's sold, outselling every other 8-bit competitor.

Commodore's colourful founder and CEO Jack Tramiel was born in Poland and was sent to Auschwitz after the Germans invaded. He escaped execution after being selected to work in a labour camp, and was liberated by American soldiers in 1945. In 1947, he emigrated to the United States, and joined the army, where he learned how to repair office equipment including typewriters.

In 1953 Tramiel worked as a taxi driver in order to buy a machine shop in the Bronx (New York) and open a typewriter repair business. He named it Commodore Portable Typewriter, a reference to his military history.

Let me put it another way then. If someone were to come to you today and say, "I want to buy a new computer," what would you recommend? I'm not talking brand name but generic. Would you tell him to buy an 8-bit computer?

Tramiel: I would tell them to buy a Commodore 64. Because it is the best machine for the money. It has 64k of memory for $595, and to match that in the next closest machine, you have to pay three times as much.

One, the Commodore 64 has 64k of memory. Two, it has good color graphics, so the man with a 64 can actually do good computing; he can do good color graphics, good games, the best in the industry. And three, with music he can have all kinds of entertainment with it, playing his own music or even writing his own music. So that, in my opinion, is the Rolls Royce of personal computers.

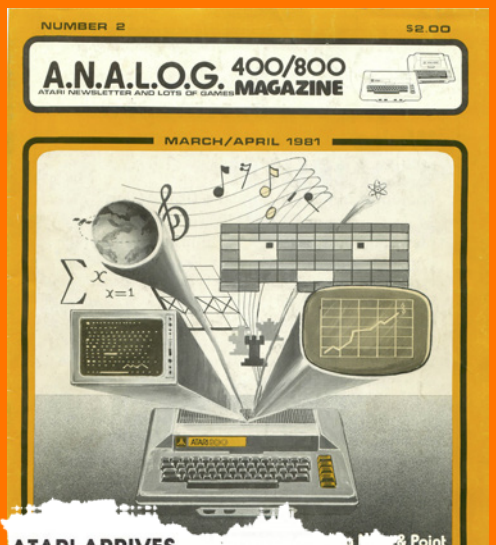
Commodore Founder Jack Tramiel, Personal Computing, September 1982.

ATARI

Video-game maker Atari entered the home computer market in 1979, introducing two models at that year's Consumer Electronics Show — the Atari 400 and the 800.

Originally conceived as a successor-console to the Atari 2600 (also known as the VCS), engineers began working on the project just after the VCS was released in late 1977. They developed an updated design that featured much-improved speed, graphics and sound. However, home computers were gaining in popularity, and then-Atari CEO Ray Kassar felt that Atari could easily compete against Apple in that market. Kassar directed the project to switch focus.

Atari management identified two potential ways the new product could be positioned: as a low-end entry-level game-console, and as a high-end home computer for business applications. In the end, they decided to go both ways: the Atari 400 with 8KB of memory and a "membrane" keyboard similar to the Odyssey², and the



ATARI INC. ENTERS PERSONAL-HOME COMPUTER INDUSTRY

Atari Inc., a division of Warner Communications Inc. and the nation's leading manufacturer of sophisticated computer-controlled video games, is entering the personal-home computer industry.

Atari will shortly introduce two new personal computer systems that have been developed for use by both those people with no prior computer experience and those with experience and sophisticated needs and requirements.

The Atari line of personal computers will have a substantial library of computer software consisting of applications such as: Personal Financial Management; Income Tax Preparation; Household and Office Record Keeping; Computer Aided Instruction in over 20 subject areas, including Math, English, History, Literature, Economics, Psychology, Auto Mechanics and many others.

Both the ATARI-400™ System and the ATARI-800™ System are programmable by the user in the most popular language for personal computers, BASIC. Other programming languages will become available on preprogrammed solid state cartridges.

The general purpose ATARI-400™ System allows an easy transition from video games to a full-fledged personal computer. The System features a 57 key monopanel keyboard, single cartridge slot for solid state programs of up to 8,000 bytes of memory, cassette recorder capability and an internal audio speaker.

The specialized ATARI-800™ System features dual cartridge capability, user expandable random access memory up to 48,000 bytes, a series of optional peripheral devices including a high speed floppy disc for mass data storage and retrieval, and a 40-column printer utilizing standard paper. The versatile and expandable nature of the ATARI-800™ System allows the consumer to select components tailored to their specialized needs. Other peripheral devices, including telecommunications capabilities are currently under development. Atari, Inc., 75 Rockefeller Plaza, New York NY 10019.

Creative Computing, April 1979

ATARI ARRIVES

It has been almost a year now since the ATARI 400 & 800 computer systems were first announced. I can assure you that they do indeed exist, for I have used both models myself, and enjoyed them very much. The system seems to be the start of a whole new generation of computers.

The ATARI system offers the advantage of snap in and out cartridges, allowing you to plug in BASIC, or other high level languages as they are available. Programs will be available both on ROM cartridges and cassette tape. Both upper and lower case is available on the screen, as well as graphics, both in high resolution and full color. A special text window is a handy function built into the system. And the cassette can be used for audio output as well as digital.

The starting price for the ATARI 400 is only $549.99, while the ATARI 800 is $999.99. I am looking forward to reviewing products for the ATARI. If you would like more details on the system, contact ATARI, Computer Division, 1265 Borregas Ave., Sunnyvale, CA 94086.

Compute! January 1980

Although announced in early 1979, the 400 and 800 would not begin shipping until November that year, largely missing the Christmas shopping season. They were expensive to make and made little money for Atari, who would later redesign them as the cheaper-to-build XL series after the FCC relaxed its stringent radio-frequency emission rules, and Commodore emerged as a competitor.

800, which could be expanded to 48K, had two cartridge slots, support for a colour monitor and a full typewriter-style keyboard. The 400 would be marketed as a children's computer, and the 800 toward older students and parents.

Stringent FCC rules surrounding the emission of television signals in the late 1970s meant that in order to plug into a TV, the new computers had to be built like tanks, with a cast-aluminium shield surrounding the internal circuitry. Other computers had avoided this by requiring the use of external RF modulators or dedicated monitors, but Atari wanted "plug-and-play" simplicity for the end consumer, and monitor connectivity to be a selling point of the 800. This meant that they couldn't have any part of the computer's circuitry "exposed" outside the case, and so Atari had to develop a single connector through which peripherals – such as disk drives, modems and printers – could be "chained" together.

Atari wanted to ship Microsoft BASIC on an 8KB cartridge, but couldn't make it fit, so they contracted Shepardson Microsystems (who created the DOS for the Apple II) who also couldn't make it fit! Instead, they created a whole new BASIC specifically for Atari. This BASIC has a few quirks, such as that every string (a series of text characters) is an array, thus making working with actual arrays of strings a messy affair.

MAX BOMB

The Commodore 64 originally started out its life in development as a video-game console called the Ultimax. Once Commodore decided to "split" the project into two, development of the console arm continued as the Commodore Max Machine. A lower-budget "hybrid" console, the Max Machine was similar to the Atari 400 in that it had cost-reduced features such as a membrane keyboard and a much smaller amount of memory than the 64.

Launched in Japan in early 1982, Commodore promoted an upcoming North American release of the Max Machine – but it never happened, with Commodore, concerned by poor Japanese sales, deciding instead to keep the VIC-20 as its low-cost offering, and restrict the enhanced features provided by its new chips to the Commodore 64. Rest in peace, Max Machine, we hardly knew ye!

Multi-role Max Christmas launch

"A RETAIL-ORIENTED, games-playing computer" is how Commodore describes the Max. After months of rumoured launches and cancellations the machine will finally appear in the shops around Christmas for £100. The Max is like a skeleton Commodore-64. It uses the same video and sound chips and has the same sprite and high-resolution graphics and sound generator but it lacks the real keyboard of the 64.

With only 2K RAM and no resident Basic, the Max will need plug-in cartridges to bring out its potential. A mini-Basic is available on cartridge, which increases the memory to 4K, but lacks arrays and trigonometric functions. Commodore claims that Max has three roles: as games machine, music synthesiser and home computer. But probably only beginners will be interested in its programming possibilities.

YOUR COMPUTER, OCTOBER 1982

COMMODORE MAX MACHINE, 3 in 1 Computer-Game Machine-Music Synthesizer, Sure to Change the Old-Fashioned Video-Game Buying Habits of Consumers

The Commodore MAX Machine, a revolutionary three-in-one home computer-game machine-music synthesizer, was unveiled at the Summer Consumer Electronics Show (CES) at Chicago's McCormick Place.

The MAX Machine, shown in prototype at the Winter CES under the code name ULTIMAX, drew raves for its extraordinary versatility, price/performance ratio and three-dimensional-style color game graphics. Now encased in an innovative futuristic housing, it will be sold late this year with an array of arcade games, as well as educational and musical programs. At a suggested retail price of $179.95—about the same as an ordinary game machine—the Commodore MAX Machine is certain to change consumers' old-fashioned video-game buying habits.

Relying on a new display chip designed by Commodore's subsidiary, MOS Technology, the MAX Machine produces color and graphics formerly available only with a highly sophisticated character generator. And because the MAX is a real computer, users do not have to rely only on pre-programmed games, but can actually create their own games, then save them on cassette tape for future use. Its 40 column x 25 line screen and 16 colors give the MAX great flexibility for unique and exciting graphics.

Using a new Sound Interface Device, the Commodore MAX Machine produces music and sound effects that rival many of the best music synthesizers now available. The MAX produces three independent voices, each with a nine-octave range, contains a programmable ADSR (attack, decay, sustain, release) generator and a programmable filter, and has variable resonance. With these sophisticated features, the MAX Machine can command astounding orchestration when it is used with a good quality audio system.

With a BASIC language cartridge, Commodore MAX Machine users can learn the fundamental language of computing and write their own programs using simple BASIC commands. MAX Machine BASIC can be translated for use with all other Commodore systems, and is capable of handling everything from word strings to math functions. With the MAX Machine's nine-digit numeric accuracy and built-in math functions, users can write a variety of useful programs for home applications.

The heart of the MAX Machine system is a new microprocessor, the 6510, designed by Commodore's MOS subsidiary.
to the 6502 chip, also designed by MOS, that made microcomputing a household activity. However, the 6510 contains additional input/outpur (I/O) lines to handle the processing required by the new system.

June/July 1982 7.

HOME ROBOTS

1983 was the year robots invaded the Consumer Electronics Show, soon after to storm homes across the world, and provide us with robotic domestic bliss ever since! Er... uh... well, maybe not.

Truth is, they never really took off. But it wasn't for lack of trying! All sorts of people got into the robot market – including Atari founder Nolan Bushnell, presumably looking for something to do after selling Atari to Warner Communications. Bushnell's Androbot made a series of robots, but they were more prototype than practical: F.R.E.D. (for Friendly Robotic Educational Device) only made simple movements, and acted as a pen for a turtle graphics program, while Fred's larger, more expensive sibling Topo had speech synthesis, but still no real usefulness. But hey, these were just the start of what everybody (or at least Bushnell) was certain would become a billion-dollar marketplace. Who wouldn't want a robot to help them around the house? Do the laundry? Clean up after dinner?

ANDROBOT

ALL IN THE FAMILY

Androbot, a robot-making company created by Atari founder Nolan Bushnell, offers a "family" of robots.

There's a strong family resemblance, too. Each member of the Androbot family looks like some kind of geometric snowman. At a mere 12 inches tall, F.R.E.D. (for *Friendly Robotic Educational Device*) is the shortest family member. F.R.E.D.'s only goal in life is to demonstrate basic robotic functions. F.R.E.D., which sells for about $350, has an attachment that lets you draw pictures on paper and your computer screen at the same time.

Topo , F.R.E.D.'s big brother, stands three feet tall and sells for about $1,600. According to Androbot engineer Bill La, Topo has a voice synthesis system that lets you type a word into your computer terminal and have Topo say it. "You can even change the tone of voice, so that Topo can sing," says Bill.

Enter, June 1984

The Future As Predicted In The Past

CRYSTAL BALL

Robotics looks like becoming the next high technology industry to undergo a 'boom'. Not this month, or next month, or even next year, but soon.

Robotics, for those who are unfamiliar with the term, is the science of robots — machines that can walk, talk, speak, understand commands and otherwise imitate human behaviour.

Robots have been popularised by science fiction authors such as Isaac Asimov and in films such as *Star Wars* but, until recently, there has been little sign that robots would ever become more than fictional characters. Admittedly, industrial robots are becoming increasingly common, particularly in Japan, but they are specialised machines dedicated to particular tasks. They do not possess the intelligence, adaptability or mobility which are the hallmarks of the true robot.

Now, however, companies which have specialised in microcomputers and other high technology areas, are actively looking at 'home' robots. Atari founder Nolan Bushnell has already set up a new company — Androbot — to develop and manufacture such robots.

The microcomputer 'boom' still has a long way to run, but companies such as Sinclair might be well advised to start working on personal robots before they get left behind. But then, who knows? Maybe Sinclair is already developing a 'metal mickey' of his own.

Popular Computing Weekly, June 9 1983

The Housebroken Robot

This year saw the unveiling of several makes of home robots from companies such as Heath, RB Robots, and Androbot. To keep the cost to a reasonable sum, most home robots have that oildrum R2D2 look, running on little wheels and slowly waving little arms under control of a microprocessor.

It's interesting that the manufacturers have invested millions in developing and building these little units without any real idea what they're good for. At the Heath press conference for the Canadian release of the Hero 1, reporters watched it trundle around the carpet and listened to it blare out with its gargley that-does-not-compute voice, and then asked, reasonably, "But what's it for?" The company officials replied that they sort of didn't know, that home computers were left up to the hobbyist's ingenuity at first, that uses would be found. It's programmable. You can make it do just about anything.

At the end of the conference people filed past a reporter who was doggedly trying to make it pick up a plastic tumbler; it kept knocking it over.

Electronics Today, November 1983

· RB5X ·

MODULAR & MUSICAL

If you're worried about getting stuck with an obsolete robot, talk to the people at the RB Robot Corporation in Golden, Colorado. Their RB5X is designed to "grow with the technology," says RB's Sharon Smith.

"It's modular, and just like a computer, you can add features as you go along," says Sharon. RB offers such features as the Bumper Music module, a ring of special sensors that attach around the outside of RB5X. When this robot bumps into something, it makes music. Later this year, RB has announced, there will be a vacuum cleaner attachment for RB5X.

A "fully loaded" RB5X costs about $5,000. If you can live without the optional extras, RB5X costs $2,295.

Even if you don't buy the options, RB5X can be made to perform some useful functions, says Sharon. Some people have attached smoke sensors and fire extinguishers to turn their RB5X into a robot firefighter. Somebody out there must be working on a lawn mower attachment.

Enter, June 1984

Frequently given away as a prize on video-game competition show Starcade, the RB5X had an RS-232 interface and a built-in Tiny BASIC interpreter. It had eight "bumper" sensors, and a photodiode for detecting the presence or absence of light, and a sonic transducer. These features made it markedly more useful than the Androbots – RB Robot Corporation, maker of the RB5X even announced a vacuum-cleaner attachment but it never made it into production. It would take until 2002 before the world would have vacuum-cleaning robots, and even then only for that.

The RB5X had an "optional" arm (we're not sure what it would be good for without it, besides chasing the cat.) But a "fully-loaded" RB5X would cost you US$5000 1984 dollars! The Hubot was a little more sensible at US$3495 – that would get you a built-in television, radio, tape deck, Atari 2600 and 128K computer.

· HUBOT ·

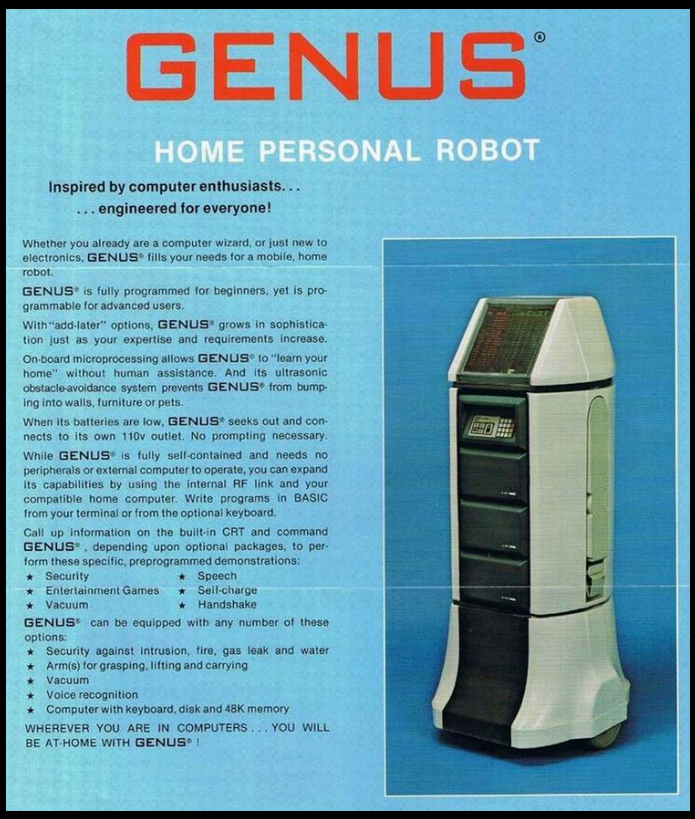
FUN ON WHEELS

At present, there seem to be two kinds of home robots in the world: educational robots like Heathkit's HERO 1, that teach you how robots work, and robots like Hubotics' Hubot, whose only aim is to help you have a good time.

Hubot, which asks "How may I serve you?" every time it is switched on, is a rolling party. This $3,495 robot comes with a built-in television set, AM/FM radio and tape deck, Atari 2600 game system, clock, serving tray and 128K computer.

Enter, June 1984

Hubot was a "robot butler" designed for entertainment. Along with a TV, Radio, and Atari 2600, it also had a speech synthesiser with a 1200-word vocabulary, and could be voice-commanded with an optional module. Using its built-in computer, Hubot could be programmed to follow a path, or be driven with a joystick. Once programmed, it could be made to follow the path again with the push of a button. It came with a simple sensor that stopped the robot if it ran into anything. Unfortunately, it appears consumers weren't eager to party with Hubot, reports suggest only around 75 units were sold.



GENUS®

HOME PERSONAL ROBOT

Inspired by computer enthusiasts. . .
. . . engineered for everyone!

Whether you already are a computer wizard, or just new to electronics, **GENUS**® fills your needs for a mobile, home robot.

GENUS® is fully programmed for beginners, yet is programmable for advanced users.

With "add-later" options, **GENUS**® grows in sophistication just as your expertise and requirements increase.

On-board microprocessing allows **GENUS**® to "learn your home" without human assistance. And its ultrasonic obstacle-avoidance system prevents **GENUS**® from bumping into walls, furniture or pets.

When its batteries are low, **GENUS**® seeks out and connects to its own 110v outlet. No prompting necessary.

While **GENUS**® is fully self-contained and needs no peripherals or external computer to operate, you can expand its capabilities by using the internal RF link and your compatible home computer. Write programs in BASIC from your terminal or from the optional keyboard.

Call up information on the built-in CRT and command **GENUS**®, depending upon optional packages, to perform these specific, preprogrammed demonstrations:

- ★ Security
- ★ Entertainment Games
- ★ Vacuum
- ★ Speech
- ★ Self-charge
- ★ Handshake

GENUS® can be equipped with any number of these options:

- ★ Security against intrusion, fire, gas leak and water
- ★ Arm(s) for grasping, lifting and carrying
- ★ Vacuum
- ★ Voice recognition
- ★ Computer with keyboard, disk and 48K memory

WHEREVER YOU ARE IN COMPUTERS . . . YOU WILL BE AT-HOME WITH **GENUS**®!

Attendees to 1983's CES were wowed by Genus the robot - after all, it was going to do all sorts of things: vacuum, navigate your house using its ultra-sonic obstacle avoidance system, play games and act as a security guard. It could charge itself when its batteries were low, talk, and even shake hands – if you paid for arms! Like its competitors, its onboard computer could be programmed using BASIC, and had a built-in monitor for displaying information.

People who saw Genus felt certain the robot-era had arrived. Like most mid-1980s robots, Genus was expensive at US$3000 to $12000 with all the options, but people felt sure there would be enough "early adopters" to make at least some of the initial models profitable, and eventually bring prices down.

Unfortunately, there weren't enough well-to-do would-be robot enthusiasts satisfied with the limited capabilities of these devices to take the plunge into robot ownership, and the market collapsed before it even got started.

Like most of the stuff in the Jetsons, such as flying cars and floating houses, Rosie the Robot never made it to real-life prime time. It's too bad, too – after all, who likes doing housework?

CHIP TO BE SQUARE

COMPUTER AND VIDEO GAME MUSIC

Going back a few years to the heyday of the Amiga 1000 (and the emergence of the 500 and 2000), there were only two main music programs available for it - Sonix and the Deluxe Music Construction Set; both were commercial products and both relied upon conventional music notation to produce songs.

There was good reason behind the latter point - in order to become a respectable music computer, the Amiga had to be able to handle proper music. Besides, the machine was still too expensive to come within the affordable reach of young hackers, or independent programmers, to whom such conventions carried little if any weight. Nevertheless, a German programmer came up with a program called SoundTracker - one which, before it could be widely distributed, was both cracked and hacked, to become its famous PD equivalent.

In spite of some alarming discrepancies in the code, which made the program crash with great regularity, SoundTracker had one great thing going for it - avoiding the pretence of using conventional notation and allowing users to sequence music directly. In order to prove its new musical worth, the now-legendary set of SoundTracker disks was released - complete with a bewildering array of both songs and sampled instruments. Most of the instruments were conveniently borrowed from digital synths, while the songs varied from barely worth listening to completely ridiculous - but a powerful musical tool (especially for non-musicians) was now in the hands of the general public, with little or no competition facing it.

Professional Amiga User, January 1992

While the SID chip in the Commodore 64 was a classy piece of tech, it was really complicated to program. If you were a budding musician but not a serious chip hacker, your options for instrument timbres were largely limited to the default sawtooth, triangle, pulse and noise – as such, any music you made still mosty resembled the bleep-bleep-bloop made by arcade machines in the late 1970s – not terribly cool amongst the hip kids of the mid-1980s. But there was hope!

If you had parents with deep pockets you could've afforded Ensoniq's Mirage. Introduced in 1984, the Mirage was a "sampler", a device that can record and play back digital audio at different pitches, based on the input it recieved over MIDI (Musical Instrument Digital Interface, a standard for connecting electronic instruments together established in 1983.) This allowed for real-sounding acoustic instruments, such as pianos, strings or drums. Chip music? Who needs it!

Software developers quickly came up with software that could exploit the Amiga's impressive audio capabilities, but these were targeted towards professional musicians, and were typically expensive and complicated –those that weren't provided very simple, stereo-typical sounding instruments suitable for accompanying Grandpa singing about the "good old days", and were not cool with the kiddies. "Free" trackers changed all of that.

But, as I said, you had to be pretty well off (or making hip-hop records) to afford that kind of gear. So, we were back to bleeps and bloops.

NEVER FEAR, AMIGA IS HERE!

At the 1984 Consumer Electronics Show, Commodore demonstrated its upcoming new computer, the Amiga. While it had several revolutionary features for its time, the wanna-be pop star was mostly concerned with its sound chip. Unlike the SID chip in the Commodore 64, the Amiga's "Paula" chip supported the playback of digital samples, like the Mirage. In fact, it could play back four of them, two through each of two stereo channels. "Stereo, you say? Surely you jest!" Yes, stereo! But the Amiga world wasn't all roses – the music software that came out early had predefined instruments and used musical notation, neither of which was ideal for our bedroom musician.

ENTER THE SOUND TRACKER.

German software developer and music composer Karsten Obarski released "The Ultimate Sound Tracker" in mid-1987. It brought in a few important paradigms that would shape its successors: each "song" contains an arbitary library of samples the user can construct individually from sound files stored on disk, and the music is arranged in a "piano roll" (referring to the paper rolls used in player pianos) with four "tracks" that can each play one note at a time.

VIVA AMIGA MUSIC TRACKERS!

Compute! describes the audio features of the Commodore Amiga (August 1 985)
Photo: Jay Miner, Project Leader on the Amiga (Infoworld, August 1985)

These tracks were themselves part of a numbered "pattern" that was a defined length (usually 64 notes), and these patterns were then arranged (and could be used multiple times!) to make up a song. The entire song, samples and all, was then saved to disk with the .MOD (for Sound Tracker MODule) extension, making them portable and tradeable on bulletin-board systems and on-line services such as Compuserve. You could also save the song with a built-in player, which could then be used for background music in a program, which made Sound Tracker very popular for Amiga game developers.

A side effect, though, was that these songs could be (and were) "ripped" from the games by knowledgeable individuals, and converted back into .MOD files, then distributed, marking the first on-line digital music piracy.

ROOM FOR IMPROVEMENT.

The Ultimate Sound Tracker was initially a commercial product, but it didn't get much notice from "serious" music circles, and it was buggy and crashed a lot (not a positive in any application, let alone a creative one.) Reviewers called it "illogical", "difficult" and "temperamental". So, it flopped. Once it was off the market it was considered "fair game", and "demo" programmers (software developers who liked to push the limits of hardware) reverse engineered it, made changes to make it more usable and stable, and then distributed it online and through magazine disks (who often had very liberal ideas about what was considered "public domain". Notable "updates" to SoundTracker included NoiseTracker in 1989, and ProTracker (pictured below) in 1990. Versions of ProTracker would soon appear on the Atari ST and for the IBM PC. 1991's OctaMed expanded the number of available tracks to eight, and then PC applications such as ScreamTracker and FastTracker II quickly increased that number to 32.

Trackers would remain a popular way of making music until the early 2000s, when digital audio workstation software and MP3 encoders made trackers obsolete.

Tracker music is typically notated as a series of directives arranged on a grid. When played back, the program works through the grid from top to bottom at a specified speed, triggering sample playback at a rate defined by a "note" (the true note of a played-back sample was often not the note that was programmed.) Other parameters (as noted below) included the octave, the instrument or sample to be played, and one of a number of commands including volume, vibrato, portamento, playback speed, pattern break and many more.

C#3 0 F C 3 3

NOTE OCTAVE INSTRUMENT COMMAND VALUE

INTERVIEW WITH A SOUND TRACKER

Jason Johannson was a member of Vancouver-based electronic music group EuphoniX in the 1990s. Paleotronic reached out to Jason to ask him about his experiences as a sound tracker.

Firstly, what made you get into tracker music?

I had some of my first tastes of "techno" in the late 80's and quickly shifted from listening to mainly metal over to that. A little strange I know, but I really like new sounds. Part of that is why I enjoyed various metal/rock in the first place. However the synthesizer is what really tickles my mind's ear.

To get back to the question though, some of the local BBS's that I frequented, had download areas for .mods and allowed uploads as well. I had also noticed that some of the artists or modders (in the historical sense of the term) were also active in the forums. I rather liked what they were doing and I had no clue as to how and what they used to make mods. I was certain that I could though. So I did with varying success and failure! Eventually I was noticed and was taken into the fold.

Did you already own an Amiga? Or did you get one just because of the sound capabilities? What else did you like about the Amiga?

I did. I started off with a PET in 1979, a year later a VIC-20 then a C64. By the time I was wanting a new computer, my mother said no way! Get your own damn computer boy! Haha...

I was old enough to have a job so I saved and bought an Amiga 2000HD from Sprite Computers. It was like magic sitting on my desk. Games were important of course. =)

But so was DigiPaint as well as Imagine. The Amiga opened the door for many things for me. Like I said, magic in a box.

What attracted you to the tracker format? What was your favourite tracker program?

It was something that I could easily understand and pick up. Especially for someone who did not know how to read or write music. I learned a lot from those days. OctaMED and later OctaMED SoundStudio Pro was my choice. I still have a paid version for the pc! And it works. Though ReNoise is a far better platform to work with now. I bounce back and forth between that and Reason.

Another reason for preferring OctaMED was it's decent midi capabilities. Once I started using an Ensoniq ASR-10 with OctaMED, I was hurled into an entirely different arena.

I had also stopped making tracker modules after that and stuck strictly to midi.

And yet another was it's sample editor. In fact, creating the sounds themselves was the best part. Arranging them into something someone might call music was and still is secondary to me. I spend way more time creating patches or mangling samples than actual writing.

What did you hate about the tracker format?

Too many of them. Formats that is. Each tracker had it's own commands for some things that were not compatible with other players. Some used more bits than others depending on what you were doing to the samples. Which proved to be a problem sometimes. But I didn't hate it as much as I had to be aware of it.

Though I will tell you that I hated being limited to only 4 channels or 2 stereo pairs. I know, I know... The limitations are what most adored and cherish. Haha. I don't mind being limited but only 2 stereo pairs was annoying to me. I wasn't into the chip music as much as trying to create something like we were able to only a few short years later. Sacrilege, I know...

Were you inspired by particular artists?

Of course! Sidewinder comes to mind. He remixed one of my tunes actually. Others from his same group at the time. U4ia is definitely another. Wow, it has been so long that names have escaped me. But there were definitely those who I tried to emulate or simply pick apart their work to see how they did it.

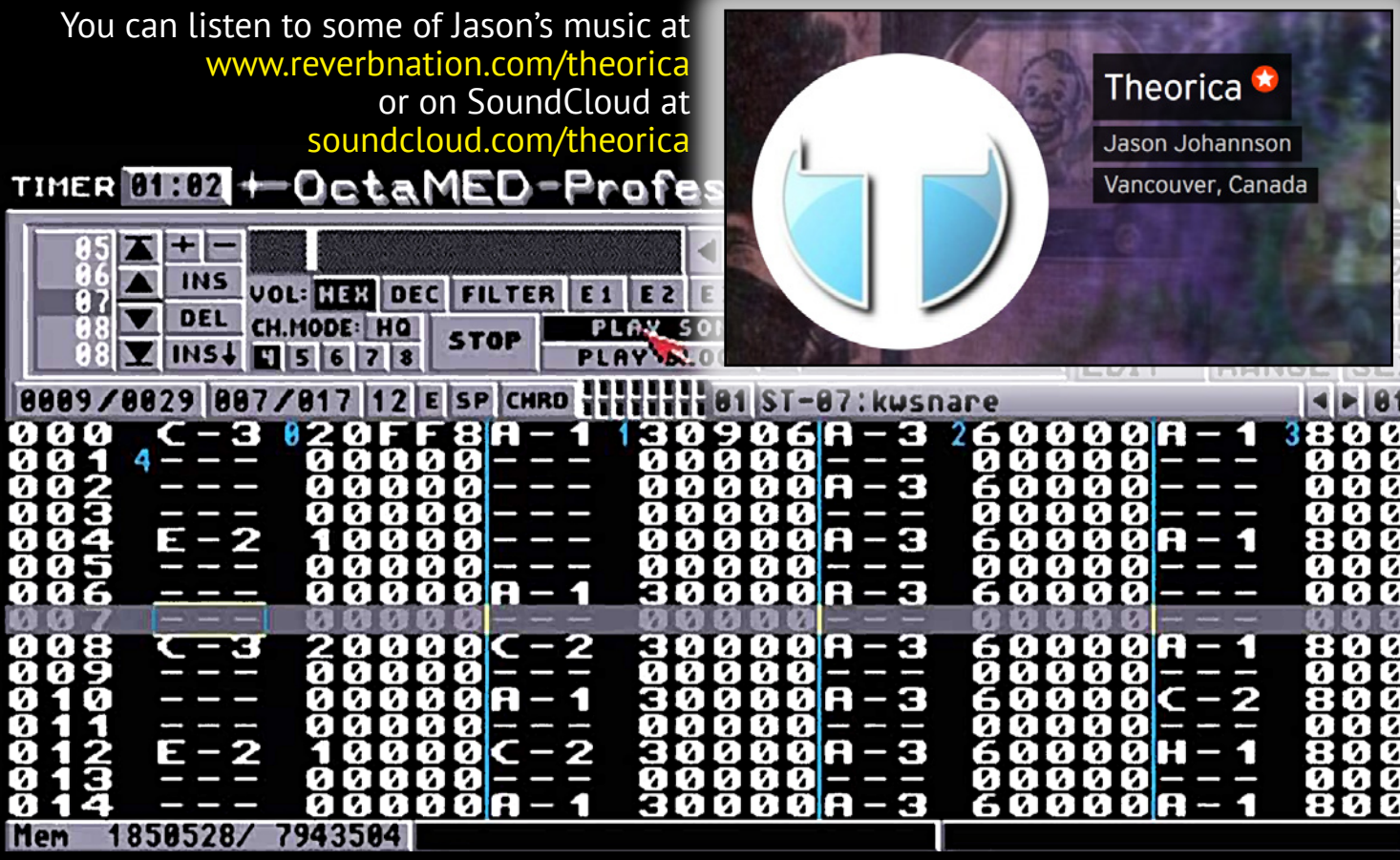
What were the ways by which you distributed your tracker files?

We were spoiled! All we had to do was prepare a text file and a great fellow named David O'Reilly took care of the rest! Heh. He always made sure everything went up on AmiNet for us. Otherwise there were a few local BBS's that we took care of uploading to. I was never a part of the group until recently, but Mistigris in 604 picked up a few of our tunes from time to time.

Did you take part in any tracker competitions?

Actually I didn't. I was sheltered and didn't venture too far beyond the walls of my local BBS haunts. =) I never thought I was good enough anyway.

You can listen to some of Jason's music at
www.reverbnation.com/theorica
or on SoundCloud at
soundcloud.com/theorica



How did you become part of tracker group Euphonix? What was it like collaborating on tracker songs?

The way that I remember it was that Darren Grant, Jovian Francey and Tom Szymanski as well as I were all "solo" on the same BBS's and so we decided to join together.

Jovian was the one who named our project Euphonix. It's actually EuphoniX with a capital X. ;) Which completely changes it into something fantastic you know. Hehe...

Even after "joining" the group, we all still went on our own merry business going solo with our work. It wasn't until we did Numbr 14 (the 14th module) that we all collaborated. It was only a short time after that, that we went midi and then we really started to collaborate as you would expect a group to.

We still did our own stuff as well but this time we would send it around to one another and when we did, we would each make our own marks on the tracks. We spent a lot of time in the studio as well and have a complete full album. Never released.

The only copy we have is on an old cassette tape but DAT's and reels do exist and are with a friend of mine (I hope he still has them) but have not been able to get in touch with him for years. There is some really good stuff on there. Completely made using an Amiga and 16bit samplers and studio effects/compression/mixing etc. I get excited every time I think about hunting that DAT down and releasing it into the wild. =)

Those were some of the best memories I have in my youth. Lots of fun. The guys really had something going. I would love to collab with them again. Keep your ears peeled. The album will in some way shape of form, make it to a release!

Which one of your own tracker songs is your favourite? What's your favourite tracker song in general?

I would have to say "Promise". It was the first one I did that was remotely coherent. Haha. It is also 16 channel and featured delay effects.

You absolutely need Octamed Player to listen to it. And I am aware that most do not. So it sounds like garbage to most. Haha!

I've always been partial to "Madness" by 4Mat.

What are you up to today? Do you still create tracker files? Are you involved in electronic music in some other way?

Unfortunately I don't dabble in tracker modules anymore. I stopped writing music all together for a number of years and it has only been the last 10 that I have been back into it as a hobby. mainly to just enjoy myself but also to learn as much as I can in the mixing process and mastering. I am finally comfortable with my audio engineering skills. Still amateur of course but happy.

I still use a tracker now and again though (ReNoise). But I spend most of my time in Reason. It's a perfect environment for someone who wants to create sounds over most of the others. I spend a lot of my time looking at the rear of the rack than I do the front.

Again, creating sounds is what I love. If sound were colour, I'd be a finger painter. =)

Thanks Jason!

The Bard's Inn

RPGs, Text Adventures, Strategy and other games that make you think.

Douglas Adams' 1979 The Hitchhiker's Guide to the Galaxy was an incredibly popular text adventure. The wacky, adventure-style nature of the novel translated well to the game, with Adams developing many unique (and absurd) scenarios for the game himself.

```
WELCOME TO ADVENTURE!!  WOULD YOU LIKE INSTRUCTIONS? Y

SOMEWHERE NEARBY IS A COLOSSAL CAVE, WHERE OTHERS
HAVE FOUND FORTUNES IN TREASURE AND GOLD, THOUGH IT
IS RUMOURED THAT SOME WHO ENTER ARE NEVER SEEN AGAIN.
```

So begins 1977's Colossal Cave Adventure, the world's first text adventure game. The player moves from place to place using simple directional (NSEW) commands, can collect items found in these locations, use these items to solve problems, and if they fail at this, get killed by various traps. Written by William Crowther and Don Woods for the PDP-10 mainframe computer, Colossal Cave Adventure would define the text adventure genre, one that would become especially popular in the early days of home computing, when computers had very limited graphical capabilities, and a few sentences were often better than a dozen blocky, monochrome images.

In 1978, Scott Adams wrote a version of Colossal Cave Adventure, titled "Adventureland" in BASIC on a TRS-80 Model I microcomputer. The first text adventure for a personal computer, Adventureland had players search for a number of "lost artifacts".

While it had no plot, the game was still popular, and released on a number of contemporary home computers including the Apple II, Commodore Pet and the Atari 800. Adams second adventure, "Pirate Adventure", added a simple storyline inspired by the novel "Treasure Island", where the player, aided by an NPC (non-player character) pirate, must build a ship to reach the island, and then find two pieces of treasure.

Developed in part using ideas from Scott's wife Alexis, the paradigms established in Pirate Adventure would largely define the rest of Scott Adams' games, and was a huge influence on what would become known later as the "interactive fiction" genre.

You can develop your own interactive fiction with Inform, available from inform7.com Inform-written games can run on Z-machine interpreters available for most modern (and vintage) platforms.

```
WEST OF HOUSE.
YOU ARE STANDING IN AN OPEN
FIELD WEST OF A WHITE HOUSE,
WITH A BOARDED FRONT DOOR.
THERE IS A SMALL MAILBOX HERE.
```

Meanwhile, four programmers at MIT were developing a Colossal Cave Adventure-inspired game of their own. Set in an ancient underground empire, Zork (a generic name used by MIT programmers for an unfinished program) was written in MDL, a LISP-like language with powerful string manipulation commands, which allowed for sophisticated interaction between the user and the game. Inspired perhaps by Scott Adams commercial success with Adventureland, three of the four

Interactive Fiction: A Novel Idea!

Zork programmers decided to "port" their game to personal computers, forming a company they called Infocom. With no MDL interpreter available on microcomputers, but wishing to use the same powerful functions MDL had provided, Infocom developed the Zork Implementation Language (ZIL), which ran on their own custom interpreter called the Z-machine. This had the added benefit of meaning they only had to "port" the Z-machine to different platforms and not Zork itself nor future games.

It soon became apparent that the vast world of Zork was not going to fit in a personal computer game, and so a cut-down version of it was released in late 1980 on the TRS-80, and in 1981 on the Apple II. The remainder of the original game was released in two sequels, Zork II and III in 1981 and 1982. Over the next two decades, Zork would have a dozen sequels.

Infocom would use the Z-machine to develop a series of "interactive novels" with sophisticated characters and storylines, such as an adaptation of the Douglas Adams novel "Hitchhikers Guide to the Galaxy", B-movie inspired "Leather Goddesses of Phobos", and "Deadline", a 1982 murder mystery that was the first game to break free of the traditional "text adventure" tropes and establish interactive fiction as a distinct genre.

Infocom wouldn't remain alone in this arena for long. At the 1984 Summer Consumer Electronics Show, Spinnaker Software-subidiary Trillium introduced a number of games based on popular novels, including "Rendevous with Rama" by Arthur C. Clarke, Robert Heinlein's "Starman Jones" and Ray Bradbury's "Fahrenheit 451", but Michael Crichton's "Amazon", based on his novel "Congo" but with a change of setting due to rights issues, was the most popular Trillium game, with as many as 100,000 copies sold. Amazon also included some rudimentary graphics, but most reviewers were more impressed with the story, which reflected Crichton's close involvement with the project.


POLICE SEIZE BULLETIN BOARD EQUIPMENT

InfoWorld

The Newsweekly for Microcomputer Users

JUNE 18, 1984 VOLUME 6, ISSUE 25 K 46908 $1.50

NOVELISTS INSPIRE ADVENTURE GAMES

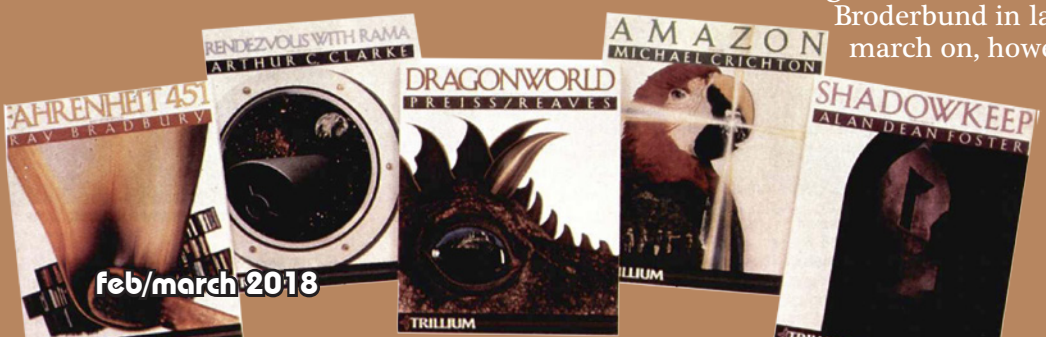
At this month's Consumer Electronics Show in Chicago, Trillium Corporation, a Cambridge, Massachusetts, subsidiary of Spinnaker Software, introduced six games created in large part by authors more accustomed to type than to bytes. The game Amazon is based on a giant computer flowchart created by Crichton and assembled into a game by Trillium programmers. Rendezvous with Rama is based on the novel by Clarke. Starman Jones is an adaptation of the Heinlein book. Fahrenheit 451 is a game derived from the Bradbury classic, and Dragonworld is based on a recent fantasy novel by Byron Preiss and Michael Reaves.

The sixth game, Shadowkeep, represents a unique event in the annals of computer games. As the game is released, Warner Books will release a novel based on the game. The book is written by Alan Dean Foster, who made his claim to fame writing novels based on movie screenplays such as *Alien*.

Amazon, by Michael Crichton, features a parrot sidekick.

Action game developer Synapse Software also got in on the action, developing their own interpreter called BTZ (or "Better Than Zork") and releasing four games in 1984, including Mindwheel, which came with a printed 93-page novella that set up the storyline in the game. Set in a dystopian far-future, the player must navigate inside the minds of a number of deceased people from our time period to establish how our society functioned despite a human proclivity toward emotion and violence. Synapse billed it as the "most complex, longest and heaviest adventure in the world."

Unfortunately, despite being praised by reviewers, Synapse's "electronic novels" were not enough to save the company, which was bought by Broderbund in late 1984. Interactive fiction would march on, however, with Graham Nelson's 1993 "Inform" programming language becoming popular for developing interactive fiction (and still is.) Inform-written games can be compiled to Z-code and run on any Z-machine interpreter.



ATARI ST

Atari boss Jack Tramiel set the tone for this trade show even before visitors arrived at their Las Vegas hotels. On desert land rented from the Howard Hughes estate along the route from the airport, Atari erected a series of huge Burma Shave-style billboards that declared:

PCjr, $599: IBM, Is This Price Right?

Macintosh, $2195: Does Apple Need This Big A Bite?

Atari Thinks They're Out Of Sight

Welcome To Atari Country
—Regards, Jack.

Compute Magazine describes how Atari dazzled visitors to the January 1985 Consumer Electronics Show. (April, 1985)

After Commodore Founder Jack Tramiel was forced out by his board, he decided, after a brief hiatus, to get revenge.

Tramiel knew that a 16-bit computer was next on the horizon for Commodore, and he wanted to beat them to the punch. So, in early 1984 he formed a new company, Tramel Technology (spelt without an 'i' to encourage people to spell his name correctly), and lured a number of Commodore engineers to jump ship and come work for him.

"Power Without The Price" is Atari's new motto, and at CES it was seen everywhere—emblazoned on banners, imprinted on T-shirts, and most importantly, symbolized by the new computers themselves. In all, Atari announced six new computers and more than a dozen peripherals. Four of the new computers are eight-bit 6502 machines, said to be fully compatible with existing Ataris, while the other two are powerful 16/32-bit computers with a Macintosh-like operating system. The more powerful computers, officially called the ST series but nicknamed "Jackintoshes," stole the show.

CES is anything but subtle, and these were merely the opening punches in what was probably the personal computer industry's most fascinating CES ever. Atari displayed a series of incredible computers at even more incredible prices that would seem impossible coming from anyone but Jack Tramiel.

Atari had not been doing well, and Atari's owner, Warner Communications, was looking to shed what it saw was "dead weight" in the form of Atari's consumer products division. Tramiel saw an opportunity to leverage Atari's manufacturing infrastructure and made a deal to acquire the division in exchange for stock in his new company. Tramiel renamed Tramel Technology to Atari Corporation, shut down most of Atari's offices, liquidated its existing stock and fired its staff, replacing them with former Commodore employees.

Surviving on its remaining video-game inventory, the new company went to work developing Tramiel's new 16-bit computer. Based on the same Motorola 68000 processor used in the Apple Macintosh, the Atari ST (the ST apparently standing for "sixteen/thirty-two" although some have speculated it stood for "Sam Tramiel" after Jack's son), was designed to be attractive to a wide variety of computer users. Like the Commodore 64, the ST could be plugged into a television for casual video-gaming, but additionally it could use a colour or monochrome monitor – the latter of which featuring a higher resolution than the Macintosh, an appeal to those in the then-emerging world of desktop publishing. It also came standard with MIDI (Musical Instrument Digital Interface) ports for controlling synthesisers, making it attractive to musicians.

Meanwhile, Atari and Commodore were suing and counter-suing each other: Commodore alleged Tramiel had stolen the technology behind the ST, and Tramiel moved to prevent Commodore from acquiring the Amiga, which had been originally promised to Atari. In the end, neither amounted to much, and Atari announced the 520ST at the 1985 Winter Consumer Electronics Show. It was soon nicknamed the "Jackintosh".

Atari 520ST / 1040 ST Specifications:

* Motorola 68000 at 8mhz. The 68000 could perform internal calculations using 32-bits but communicated with the rest of the computer using a 16-bit "bus".
* 512 / 1024 kilobytes of memory. Since the operating system was shipped on a ROM (read only memory) chip, most of that was available to programs.
* 320x200 "low-resolution" with 16 colors from a palette of 512 colours, 640x200 with 4 colours, and 640x400 monochrome.
* 3-voice square-wave + 1 voice noise sound chip with MIDI in and out ports.

Point & Click

the era of the desktop

The New Atari Computers: Power without the Price

ANALOG Computing, March 1985

The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying—easy-to-use computing power without the price.

The Jackintosh... a real GEM

While the Atari ST's specifications were impressive, what really stole the show was its operating system, GEM. Tramiel licensed GEM (short for Graphics Environment Manager) from Digital Research, who had initially developed it for their CP/M operating system and later ported it to MS-DOS. Tramiel wanted to give his new computer a user-interface layer similar to the Macintosh, but for a much lower price, and GEM fit the bill nicely, especially since Digital Research had no interest in 68000-based computers, it being fully focussed on the Intel 80286.

Like the Macintosh, the ST used a mouse for much of its user interaction. It had icons that represented disk drives (represented as drawers from filing cabinets), applications (although not customisable as they were on the Macintosh), documents and the Trash (a particularly egregious theft from Apple's Finder.) GEM had a menu at the top of the screen, a "Desk" menu extremely similar to the Macintosh's "Apple" menu - it's no surprise Apple was unimpressed with GEM.

Apple sued Digital Research, but not because they were concerned about competition from Atari - the ST appealed to a much different market than the Macintosh. No, Apple was afraid of GEM becoming widely available on the PC, which was beginning to approach the Macintosh in terms of hardware capabilities, and could become a serious threat if combined with decent graphical operating system.

Digital Research ended up agreeing to change many elements of GEM on the PC in order to satisfy Apple (and Microsoft would be made wary not to borrow too much from the Macintosh for their Windows software), but the Atari version would remain untouched, allowing Atari to continue to unofficially market the ST as a "budget Macintosh". The ST would save Atari – close to bankruptcy by the time of its launch – and go on to commercial success, sharing the home computer market with the Commodore Amiga for a number of years.

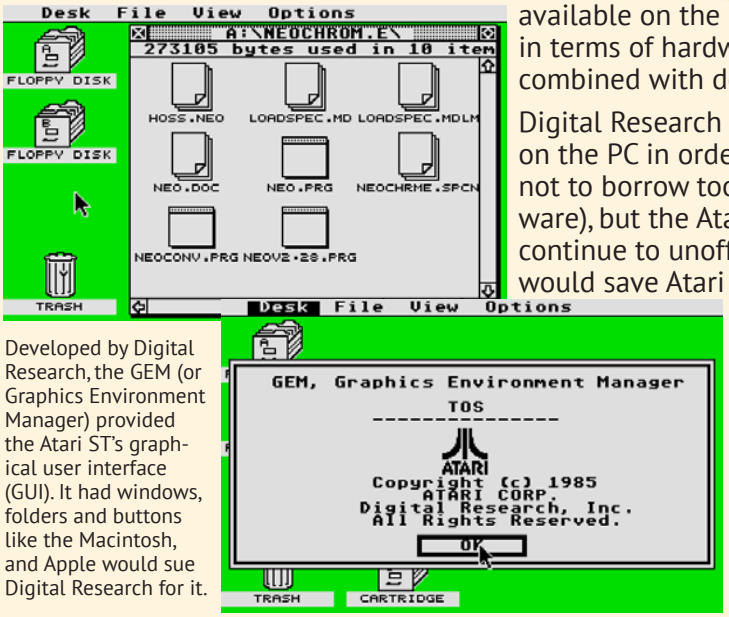
In 1986, Atari released versions of the ST that had built-in floppy drives. Strong office sales in Europe prompted Atari to release a "business" version of the ST, called the Mega, and a laser printer that connected to the Mega directly. In 1989 the STE models would add stereo sound and more display colours.

As the advertising agency for Apple Computer put it in an ad for the Macintosh, people don't want to read stacks of documentation in order to use a computer. The computer should be designed so that they can sit down in front of it and use it right away. That's what the Macintosh does. . . and so does the ST.

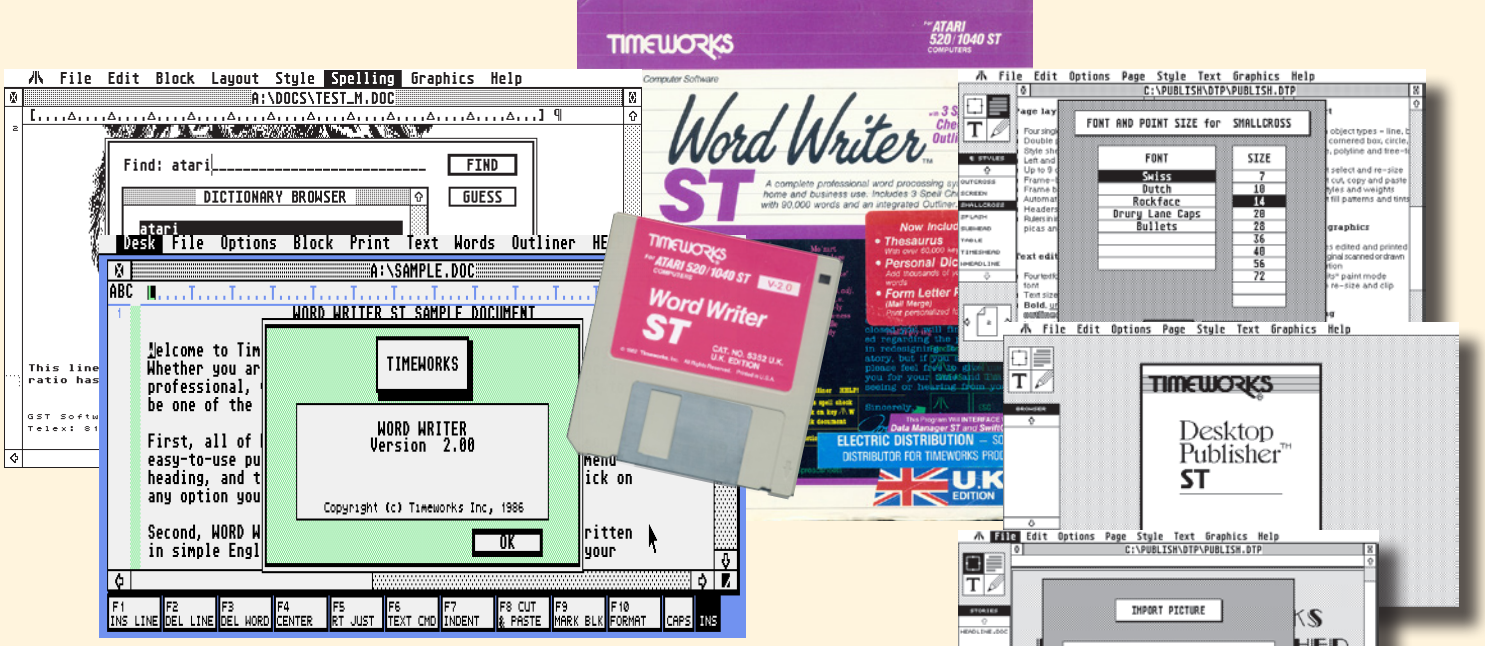
You're going to hear GEM being compared to the Macintosh user interface very often, and with good reason. They are functionally very similar. Both make it easy for the first-time computer user to operate complex software. Both are graphically oriented. Both use mice to point to user selections. But the ST, with its GEM interface, costs much less than a comparably featured Macintosh. In addition, GEM operates in full color on the ST, an added dimension which I enjoy.

A cheap computer with a Macintosh-like desktop was well received by both Atari and Commodore users.

Analog Computing, July 1985



Developed by Digital Research, the GEM (or Graphics Environment Manager) provided the Atari ST's graphical user interface (GUI). It had windows, folders and buttons like the Macintosh, and Apple would sue Digital Research for it.

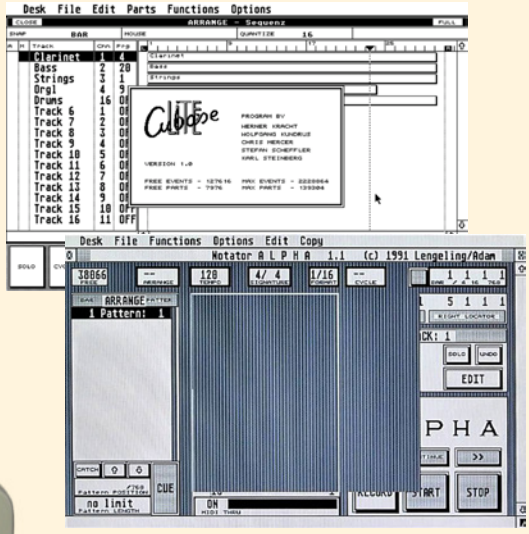


Timeworks Desktop Publisher ST was notable for being one of the first desktop publishing packages affordable for home users, priced around $US100.

A large amount of the ST's success can be attributed to business software developers, who very quickly recognised the computers potential for productivity applications, including WYSIWYG (what-you-see-is-what-you-get) word processing and desktop publishing. Indeed, paired with its companion high-resolution monochrome monitor, the ST would become popular with small business owners and not-for-profit organisations who could not justify the cost of a Macintosh, but wanted to create more professional-looking documents than what could be produced on an 8-bit computer system.

UK software house GST's "Timeworks Desktop Publisher" was an affordable desktop publishing program that could run from a floppy disk, unlike more expensive competitors, and it became very popular, often paired with Timeworks Word Writer ST, a word processor that supported menu-based operation, multiple fonts and had a spelling dictionary.

The monochrome monitor was also used with most music sequencing applications, whose WYSIWYG interfaces also (in combination with the computer's built-in MIDI hardware) made the ST popular with musicians and studios. Several software packages were released including C-Labs Notator and Steinberg's Cubase. Many studios would continue to use the ST as a reliable solution up until the turn of the 21st century, when modern digital audio workstation (DAW) software on PC and Mac largely took over.



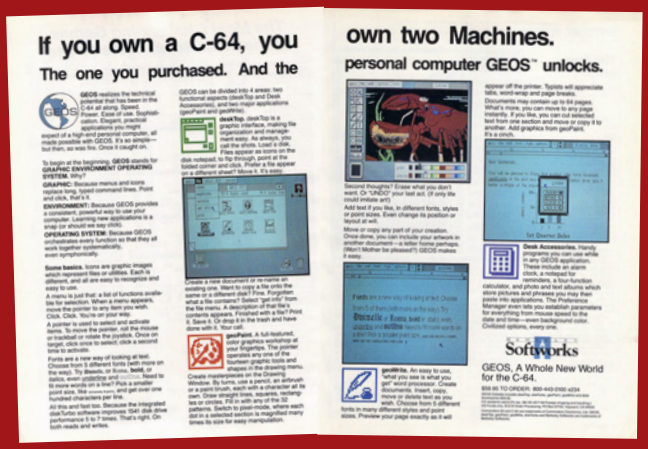
MIDI-based music applications like Cubase and Notator allowed users to record, arrange and play-back note information received from MIDI-equipped synthesisers and other instruments using a straightforward GUI interface.

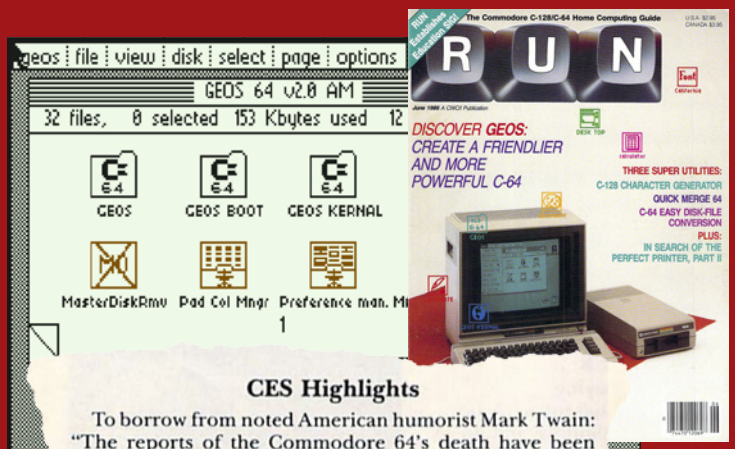
The ST was used by notable artists such as Jean Michel Jarre, Kraftwerk and Tangerine Dream.

Unfortunately, although popular in niche markets, by 1993 the personal computer world had turned its focus almost entirely toward Microsoft Windows and the PC, and Atari discontinued the ST to focus on its Jaguar video-game console.

GEOS

Graphic Environment Operating System





CES Highlights

To borrow from noted American humorist Mark Twain: "The reports of the Commodore 64's death have been greatly exaggerated."

With the introduction of the C-128, industry critics were quick to forecast the demise of the C-64. Fortunately, developers weren't listening to these dire predictions and are continuing to bring out new products for this popular computer, which has an installed user base of several million. The recent Consumer Electronics Show in Las Vegas was the showcase for some of these new developments.

"We want to put the rumors to rest: The C-64 is alive and well!" So exclaimed one Commodore spokesman who introduced GEOS (Graphic Environment Operating System), a new operating system for the C-64. Developed by Berkeley Softworks and demonstrated at a private Commodore showing by Berkeley president Brian Dougherty, GEOS lets you manipulate icons, windows and pull-down menus—just like on the Apple MacIntosh or Commodore Amiga!

RUN, March 1986

While Commodore's 16-bit Amiga computer became available around the same time as the Atari ST, it was much more expensive and its GUI was "different". Berkeley Softworks, formed by a pair of former video-game developers, had some leftover GUI code from a failed in-flight entertainment system called the "Sky Tray", and one of Softworks' founders realised this could be used to create a graphical environment for the Commodore 64.

In 1985 GEOS (for Graphical Environment Operating System) v1.0 was sent to outside developers so that they could begin creating software for it, and at the Winter Consumer Electronics Show in early 1986 it was released to the public along with an included word processor (geoWrite) and a graphics program (geoPaint).

Interested in breathing new life into sales of the 64, Commodore reached a deal with Berkeley to bundle GEOS with new computers, starting in 1987. Consumers could also purchase an optional mouse.

GEOS bore a great many similarities to the Macintosh operating system, and was an impressive feat on a 64 kilobyte machine, but suffered from some of the Commodore 64's limitations, including its slow disk drive speed. Unlike Apple's Disk II, Commodore's drive was self contained, and communicated with the computer using a very slow serial connection over which it only transferred a single bit at a time.

To solve this, GEOS's developers came up with their own method of reading files from the disk, called turboDisk which could "burst" transfer eight bits before synchronising. However, users that had only one disk drive still found themselves doing the "floppy shuffle" quite often.

Commodore 128 users had a much easier time than their C64 cousins when the C128-specific version of GEOS, which used its expanded RAM and faster, larger capacity disk drive came out in 1987.

The aging Commodore 64 would get a refresh in 1986 with the 64C, made to look like the Commodore 128 released a year earlier, and following Atari's 1985 update to the 800XL, the 65XE, which featured a similar case to Atari's own 128KB computer, the 130XE.

Commodore would ship GEOS with the C64C starting in 1987, in an attempt to keep the 5-year-old computer relevant with consumers. It came with a paint program, geoPaint, and a word processor, geoWrite.

PIXEL

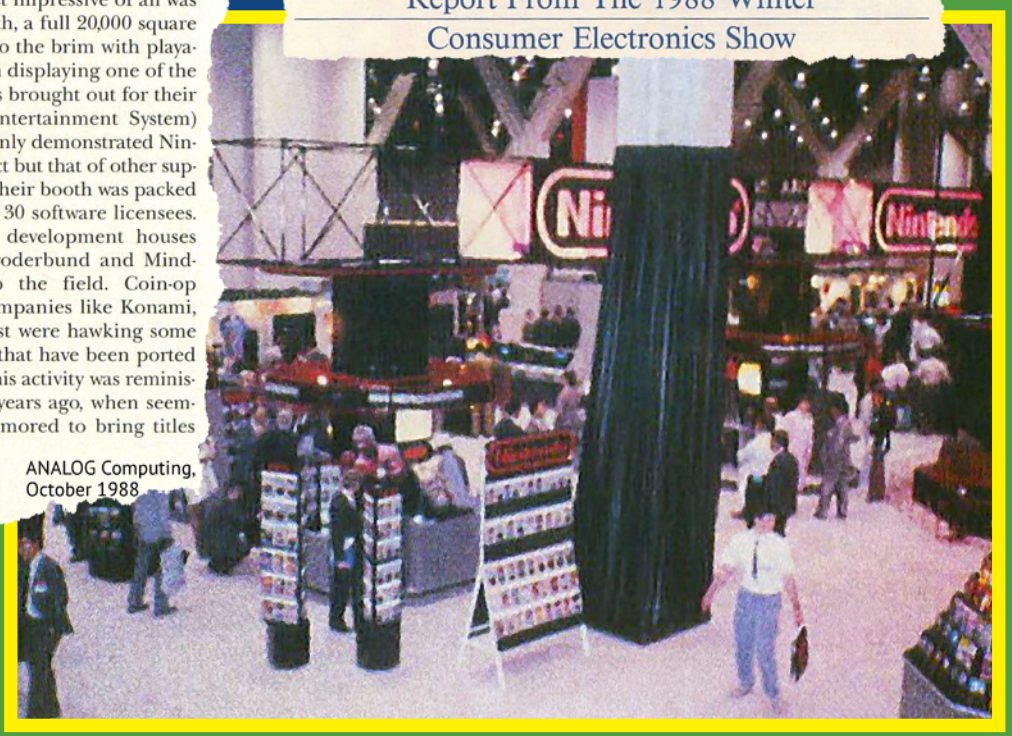
Console and

The 1983 Video Game Crash had plugged up the North American console industry, and it would take a pair of Italian plumbers to unclog the pipes and let the sales flow once again... Mamma Mia!

Report From The 1988 Winter Consumer Electronics Show

Biggest and most impressive of all was the Nintendo booth, a full 20,000 square feet in size, filled to the brim with playable machines, each displaying one of the more than 90 titles brought out for their NES (Nintendo Entertainment System) console. This not only demonstrated Nintendo's own product but that of other supporters as well, as their booth was packed with most of their 30 software licensees. Familiar software development houses like Activision, Broderbund and Mindscape headed up the field. Coin-op manufacturing companies like Konami, Taito and Data East were hawking some of the arcade hits that have been ported over to the NES. This activity was reminiscent of five short years ago, when seemingly everyone clamored to bring titles out for the 2600.

ANALOG Computing, October 1988



PLAYAS

Home Computer Video Gaming

Gaming GoodNES from Japan

by Paul Monopoli

During 1983 a home console revolution started in Japan with the release of the Nintendo Famicom. Short for Family Computer, this new console was designed to take video games beyond the giant pixels and beeper sounds that they were known for at the time. To match the hardware, Nintendo brought over some of their best game designers to work on the project. Shigeru Miyamoto was one designer assigned to the Famicom, and it is here that he would create the games that would make him a household name.

Hiroshi Yamauchi, the president of Nintendo at this time, was a man who got what he wanted, and what he wanted was to replicate the Famicom's success in the West. He approached Atari, the current leader in the video game market, to strike up a deal. The agreement stipulated that the system would be labelled as an 'Atari' console in the US, and they would become the distributors, while Nintendo would create the hardware. Atari were also granted exclusive home publishing rights over the Nintendo library of games to go along with the hardware. The deal was all ready and was to be finalised at the 1983 Consumer Electronics Show.

The CES of 1983 saw a number of future failures, including the Odyssey Command Centre and the Coleco Adam computer. It was this latter system that upset Atari, as the computer was shown demonstrating a port of Donkey Kong. The Coleco Adam was capable of playing Colecovision games, but while that port featured a cut down version of Donkey Kong, containing only 3 levels, this new version of the game was alleged to be complete. Negotiations with Atari had hit a wall, but they were still talking to Nintendo.

Later that year Ray Kassar, the CEO of Atari was forced to resign over allegations of insider trading. James J Morgan became his successor, and under his tenure with the company Atari was split up and sold off, with the consumer division being sold to former Commodore CEO Jack Tramiel in 1984. In a move they would ultimately regret, Atari closed negotiations with Nintendo. Some commentators have noted that Atari were confident that their new 5200 console would repeat the success of the earlier 2600, but the video game market was starting to look a little shaky in the US. Eventually it would crash, and the video game industry was all but dead.

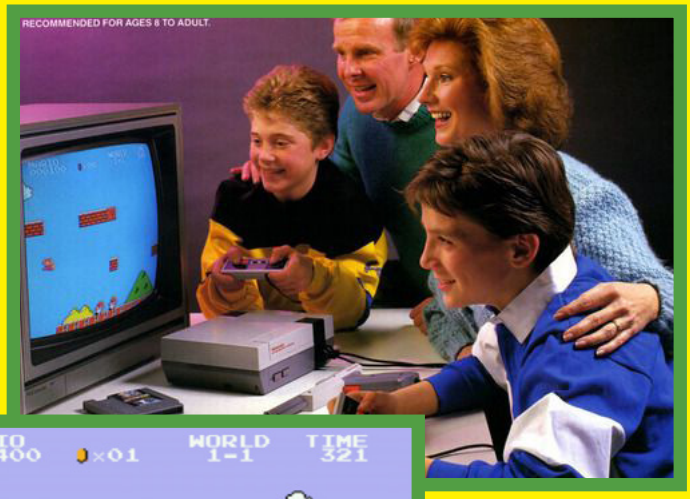
NINTENDO'S FINAL SOLUTION

Known for arcade classics like **Donkey Kong** and **Punch-Out** in the U.S., Nintendo has built its reputation in Japan as the leading manufacturer of home videogame systems with its Advanced Video Entertainment System (AVS). Having sold more than 2.5 million AVS units there, Nintendo has decided to distribute the AVS here, perhaps as earlier as this spring.

Considering that the videogame market in America has virtually disappeared, this could be a miscalculation on Nintendo's part. Described as similar to Atari's never-released 7800 system, and as an improvement over ColecoVision, the AVS features a Nintendo arcade games "hall of fame" series and a "light wand" that is intended for target-type games. The joysticks are wireless and no other cartridges are compatible with the AVS. A keyboard may at some point be sold as an accessory.

Electronic Games, March 1985

Unperturbed, Yamauchi continued with his plan, ordering his developers to redesign the system for the US audience. Video games had a bad reputation, but the home computer market was still successful. Nintendo were already working on a Famicom keyboard and BASIC programming language with Sharp and Hudsonsoft. All they had to do was to combine these elements and they would have a home computer.



Nintendo debuted their 'Advanced Video System' at the 1985 CES. Like other computers of this era the keyboard housed all of the main components. The system was shown with a tape drive, light gun and two controllers. While commentators at the time appeared to be intrigued, the overall reception towards the computer was poor. Commodore, Atari and Apple were the leaders in the home computing world at the time, and this small player from Japan would be hard pressed to make a dent in their sales.

American department store chains were not interested in selling video games and there was clearly no place for Nintendo in the home computer market, so Yamauchi had to consider his next move carefully. Department stores didn't want to sell video games, but they were more than happy to sell toys, and Nintendo had previously been successful in this area. Gunpei Yokoi, Nintendo's most successful toy designer, was tasked with creating a Famicom accessory in the guise of a toy.

Yokoi developed the Robotic Operating Buddy, known as R.O.B. This plastic pal was able to play games with children, but only through the Nintendo AVS. R.O.B. was Yamauchi's ticket into US department stores, and he was so confident that he shipped one hundred thousand units to New Jersey to be distributed to retailers. As well as being sold with a new accessory, the AVS had undergone a few more changes. Now known as the Nintendo Entertainment System, this American version of the Famicom was designed to look less like a computer or video game system and more like a VHS or Betamax player. Even with these changes retailers were dubious.

At the time Yamauchi's son-in-law, Minoru Arakawa, was in charge of the American arm of Nintendo, and he was already in a difficult position. Having felt responsible for the earlier failures to break the Famicom in the West, he went behind his father in law's back and assured retailers that they would be able to return any unsold NES systems and receive a full refund. There was no way they could lose. Yamauchi was incensed, but the strategy worked, and after successful sales in New York, Nintendo branched out into other markets. Success continued and the Nintendo Entertainment System was released nationally in 1986. ***Continued on page 104***

Year Of The Cartridge—Or Is It?

In many ways the computer section of CES *was* Nintendo and Sega territory. Nintendo's booth alone occupied a major portion of the floor space, its racks adorned with dozens of game packages, and more than a few of them translations of established computer entertainment packages. It seems 1988 will be remembered for many things, and one of them is the dramatic comeback made by dedicated videogame machines. Nintendo, Sega, and Atari are all showing strong sales, attracting many customers who might otherwise choose to buy a 64 or 128.

COMPUTE!'s Gazette April 1988

EA founder Trip Hawkins famously called the NES the death of the computer video game industry, but computer magazines put on a brave face, insisting the fight wasn't over.


ELECTRONIC FUN · GAMES

VECTREKKING!

Are you tired of having to share the TV with people who want (of all things) to watch programs instead of playing video games? Do you want to play arcade-quality games in your room, your friend's room or someplace where you won't be annoyed by (a) your parents, (b) your kids, (c) your baby brother who drools on the cartridges, or (d) your sister who always wants to know what you did with her Clash album? If you answered "Oh God, yes!" to any or all of the above, have we got a system for you! It's an all-in-one game system with its own TV screen, an arcade-type control panel, arcade memory and graphics chips and 12 cartridges (so far) plus one resident game. And it only costs $200—about the same as any

home video game. What is the name of this

graphics which are composed of

What really sets Vectrex apart from other home video games is the type of screen it has. Rather than being a raster type—that is, using

joystick to a ... unit. Instead it is a true panel with a small joystick on the far left and four pleasantly concave function buttons to the left, each one controlling a different action in a different game.

The panel folds up neatly into the bottom of the unit, doing away with messy wire tangles. It is attached by a 6-foot coil cord, allowing you enough room to

GCEs Vectrex uses a vector screen, which gives smoother graphics than a TV.

Electronic Fun with Computers and Games November 1982

Vectrex has a vector screen. Vectors don't rely on pixels and therefore the graphics are smoother and slicker, resembling those found on arcade games such as *Asteroids* and *Tempest*.

Unveiled at the 1982 Summer Consumer Electronics Show, the Vectrex's vector-based graphics wowed the crowd.

In 1980, John Ross of Smith Engineering found a 1" (2.5cm) cathode-ray tube while scavenging through a surplus warehouse in Los Angeles. Thinking that the CRT could be used to make a vector-based handheld game, Smith experimented with generating vector-based graphics on it, but after receiving feedback critical of the proposed portable game's small screen size, they decided instead to build a 9" (23cm) "tabletop" unit. They licensed the technolgy to General Consumer Electronics (GCE), who released it in November of 1982. Initial sales were so strong that board game manufacturer Milton Bradley bought GCE out in early 1983.

The Vectrex featured a 1.5mhz Motorola 6809 (the same processor used in the Tandy Color Computer) and 1KB of RAM used for in-game variables. Games were stored on 32KB cartridges. The display was only monochrome, but this was partially made up for with transparent overlays, which coloured various parts of the screen.

But players didn't mind – the pixel graphics used by Vectrex's competitors were quite blocky as the resolution of video-game consoles such as the Atari 2600 was quite low, and the Vectrex's vector graphics were much sharper and its animation smoother.

Unfortunately, despite the Vectrex's initial success, Milton Bradley's acquisition of GCE turned out to be a serious mistake after the video game crash of 1983 sent sales tumbling. Milton Bradley was forced to merge with Hasbro to survive, and the rights to the Vectrex reverted to Smith Engineering, who planned to once again use the technology to produce a handheld game. However, the appearance of the Game Boy put an end to those plans, and the Vectrex – and its vector-graphics display – was shelved forever.

Star Trek: The Motion Picture was one of the first games available for the Vectrex. In the game, the player flies through space battling with Klingon and Romulan ships in an attempt to reach the Klingon Mothership. Using the Vectrex's four controller buttons, players could fire phasers, control shields and dock with space stations to replenish both.

When one thinks of vector graphics one tends to think of Asteroids or Tempest, but a surprising variety of games were created for the Vectrex, including a version of Atari's racing game Pole Position, and Heads Up, a soccer game. There was even a roller coaster simulator (3D Crazy Coaster) that used special glasses containing rotating discs to create the illusion of colour and depth. However, most of the Vectrex's 29 official releases were space games.

The GCE Vectrex system was displayed at CES. It's great! Real arcade action...

GCE

General Consumer Electronics is the newest and, in my opinion, one of the most significant entrants in last few months. Their system Vectrex will be a major contender in the video game arena.

Vectrex is a self-contained system—meaning it is not played on your TV set. This is an advantage not only because it frees up the TV but also because the graphics on Vectrex can be—are—outstanding. It uses a Vector screen—as opposed to the vaster screen found in TV sets—which gives the illusion of 3-D. The driving games particularly are outstanding, with the distance perspective almost frightening. At one point during the game Hyperchase you enter a tunnel so realistic you feel claustrophobic.

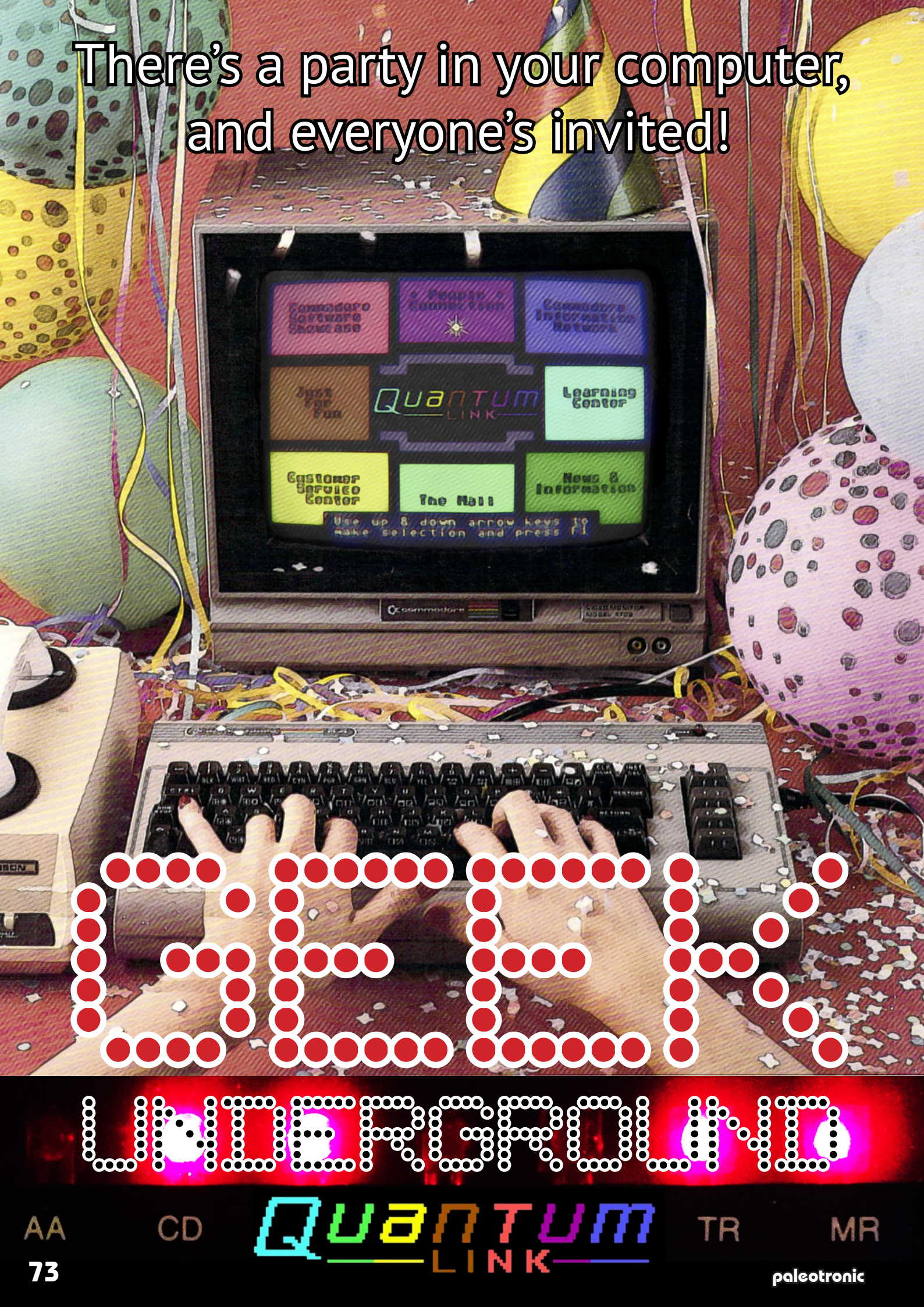
The control panel consists of a small 360 degree joystick and four buttons, each with a different function depending on the game being played. Vectrex has a black and white screen, so each game also comes with an overlay which adds color to the graphics.

There are thirteen games available, including the resident game, Mine Storm. The system runs about $200 and will be available early this fall.

There are at least five other manufacturers, including Emerson, SJA, Video Technology Inc., Entex, and Tryom but, at present each is simply, in my opinion, a facsimile of the ones we've just covered.

Video-Games Player Fall 1982

Vectrex


There's a party in your computer,
and everyone's invited!
Commodore Software Showcase
People Connection
Commodore Information Network
Just For Fun
Quantum Link
Learning Center
Customer Service Center
The Mall
News & Information
Use up & down arrow keys to make selection and press F1
Underground
AA
CD
Quantum Link
TR
MR
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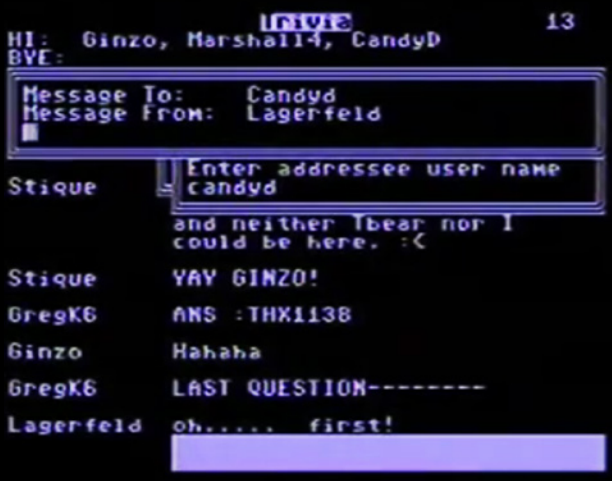
paleotronic



Visitors to the Commodore booth at the 1986 Consumer Electronics Show were not only introduced to the newly restyled Commodore 64C and GEOS, but also a colourful new information service called Quantum Link.

Typical 1980s on-line services were accessed using generic terminal software running on the user's computer. To reach the widest possible customer base, they kept themselves platform-agnostic by only using the standard ASCII (American Standard Code for Information Interchange) character set common to every modern computer system. This meant that text information was presented in a very plain fashion, and while it was arguably the most practical method, it was also boring!

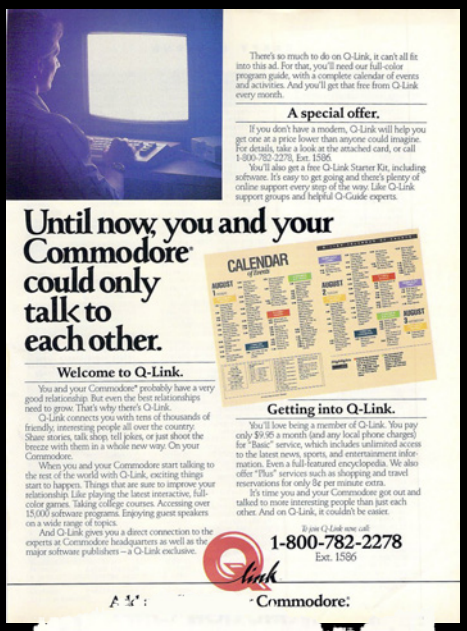
In 1983, Bill von Meister founded Control Video Corporation, whose sole product GameLine was a download-on-demand system for the Atari 2600. Perhaps ahead of its time, it soon failed. After von Meister left the company, CVC consultant Jim Kimsey saw potential in the home-computing arena, and organised a restructure of CVC, buying its assets and renaming it Quantum Computer Services. In 1985, QCS launched Quantum Link, a new on-line service available in the US and Canada, based on software licensed from regional New York-based PlayNet (see next page, bottom.)

Unlike rival services with their boring ASCII presentations, Quantum Link used custom client software running on the user's computer to interact with its servers and present information. This allowed Q-Link to use the colours and graphics characters and modes available on the client computer system (in Q-Link's case, the Commodore 64) allowing for a much more engaging experience than its competitors. Quantum Link's custom software could also provide a much friendlier menu-driven user interface, with more powerful text editing and other abilities not possible using a generic ASCII terminal.

Quantum Link users could send electronic mail, use on-line chat rooms, download files, read the news, send instant messages to other users, and play a number of multiplayer games, including classic board games and games inspired by contemporary TV game shows. In late 1986, Q-Link expanded, adding casino games, a database dedicated to rock music, an on-line auction service and the ability for users to have customised avatars digitised from photos they sent in to the service.

Commodore bundled the Quantum Link client software with 64C computers sold in North America, which offered a free trial period for users to "test drive" the service. Q-Link would soon expand to other client computer systems, including the Apple II with AppleLink and the IBM PC with PC-Link.

In 1989, Quantum Link changed its name to America On-Line and in the late 1990s became infamous for spamming North American mailboxes with client-software CDs, commonly used by unwitting recipients as coffee coasters.



QuantumLink differs from GEnie and CompuServe in that it's the only one of the three that is, in both content and access, a Commodore-exclusive network. In order to log onto Q-Link, you *must* use its proprietary software on a C-64 or a C-128 (in 64 mode). This approach is an important factor to consider when evaluating QuantumLink.

Software To Live and Die By

Of the three big networks, Q-Link's custom software is the easiest for beginners to learn, because it's completely menu-driven, colorful and very simple to use. Logging on is automatic: when you load the software, your computer and modem dial your local access number and get you onto Q-Link without the use of a password.

RUN · DECEMBER 1988

Initially called Habitat during its beta-test period and renamed Club Caribe at its launch, this popular feature of Quantum Link was developed by Lucasfilm Games. Users were able to design a personalised avatar and then wander around a virtual island resort, interacting with other users, collecting and using objects and money.

Club Caribe was known for its quirks – for example, users could treat their avatars' heads as objects, taking them off and carrying them around. Those who made the mistake of dropping their heads were mortified upon the realisation that other users could steal them, leading to the unsettling display of headless avatars wandering around the island.

The Habitat software would become the basis for Lucasfilm Games' SCUMM engine, used in (and in-part named for) the first point-and-click adventure game, Maniac Mansion, in which a teenager goes on a quest to rescue his girlfriend from a mad scientist. The game was lauded for its comedic cut-scenes and wacky humour.

Q-Link Announces Shut-Down

The premier Commodore-only Quantum Link on-line service has finally announced that it will cease to operate on November 1, 1994. QLink was originally launched in November of 1985, but since its owners turned more of their attention to their America On-line for Macintosh and MS-DOS machines in the early 90's, the services and quality of the QLink system have continually declined.

Users with Lifetime memberships on QLink can transfer that membership to an America On-line account. This will, however, require that you have either an MS-DOS or Macintosh computer. To obtain a sign-on kit for America On-line, contact AOL Customer Service at 1-800-827-6364. After signing on, you must inform AOL Billing that you wish to transfer your QLink Lifetime Membership to your new AOL account.

Additional information concerning this shutdown, account transfers, billing, and use of accumulated Qpons may be obtained from messages posted in QLink's Customer Service area.

Commodore World, March 1994

However, despite Club Caribe's popularity, technology marched on, and as common usage of the Commodore 64 declined, so did the userbase (and the profitability) of the Quantum Link service. It was no surprise to anyone when, in 1994, America On-Line finally decided to close Q-Link's virtual doors, shutting it down in November that year, and bringing the 8-bit era of telecomputing to a quiet, but emphatic close.

Over the next several years America On-Line would find itself confronted by its own increasing irrelevance. As the Internet gradually took over from on-line services, AOL would eventually transition to a web-portal and then a successful media company.

Halt and Catch Fire's fictional 1980s startup Mutiny is based on PlayNet, a New York-based on-line service founded in 1983 by two former GE Global Research employees, Dave Panzl and Howard Goldberg. PlayNet used custom software running on customers' Commodore 64s that provided games that they could play against each other while chatting, such as Checkers and Connect 4.

The founders initially bootstrapped the company with their own money, but once it gained traction obtained $2.5 million in outside venture capital. At its peak, PlayNet employed 30 people and had 3000 customers, with around 200 able to be logged in at one time, using 300 baud modems.

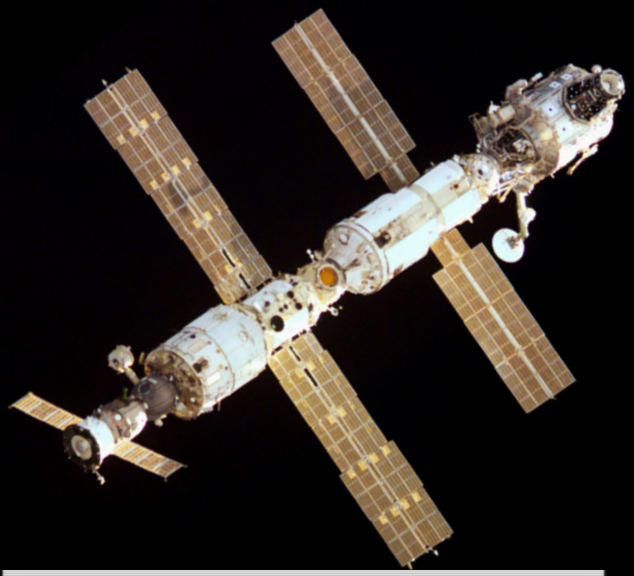
In 1985, Quantum Computer Services licensed the PlayNet software and used it as the basis for Quantum Link, paying a royalty to PlayNet. Unfortunately, it appears there wasn't enough room in the market for two Commodore 64-only on-line services, and PlayNet declared bankruptcy in 1986. Probably sensing PlayNet didn't have the funds necessary for a protracted legal battle, Quantum Link ceased paying royalties afterward, forcing PlayNet to shut down in 1988.

Halt and Catch Fire was a television series on AMC (American Movie Channel) that ran from 2014 to 2017. The show follows a number of characters involved in the technology industry from the early 1980s until the mid-1990s. In season two, programmer Cameron Howe (Mackenzie Davis, right) forms Mutiny with Donna Clark (Kerry Bishé, left), a former Texas Instruments engineer.

Although it had low viewership throughout its run, it was critically acclaimed, and that led AMC to renew it three times, the last time for a final season, which had a satisfying finale. If you haven't yet, Paleotronic wholeheartedly recommends watching this show!

paleotronic

EMULATION STATION



The Neohabitat project is an effort to revive the Quantum Link Club Caribe service. Modern users can experience Neohabitat by visiting the project's website at www.neohabitat.org and downloading a customised Commodore 64 emulator.

Paleotronic spoke with one of the project's lead developers, Steve Salevan, about why he decided to help resurrect Habitat...

Were you a Quantum Link user back in the day?

My dad was a QuantumLink user and the service was my first exposure to the Internet as a young kid. I remember being absolutely entranced that we could obtain games and SID tunes on demand, and I'd constantly pepper my dad with download requests.

Did you frequent Club Caribe?

Alas, I first discovered Habitat/Club Caribe through reading an old Q-Link magazine as a teenager, long after the service had been shut down.

What part do you play in the NeoHabitat project?

I'm a lead developer and provide hosting for Neohabitat's online presence through Spine, the cloud provider that I created.

What prompted you to help resurrect Habitat?

I'd always wanted to play Habitat since first discovering it and I learned of the Neohabitat project through a post on Reddit's Commodore forum, one fateful Saturday afternoon. I'd just quit my full-time job at Twitter and was looking for a fun hack to get into before transitioning into my current role at Spine. Gosh, was it ever.

What main challenges were there in resurrecting Habitat?

Initially, our biggest challenge was in building a server that could speak the 1980s protocol used by the Commodore 64 client software. Randy (Farmer) tackled this problem by implementing a Node.js-based bridging service to translated this protocol into modern JSON, allowing us to focus next on building the game logic.

We had a major leg up on the game logic side of the equation, as Randy and Chip (Morningstar) had recently open sourced Elko, a foundation for MMO services that was a direct descendant of the technology they'd built for Habitat. Randy developed much of the base logic we'd need to port the original PL/1 source to this Elko-based platform.

Habitat was an extremely expansive game for its time, with over a hundred different interactive objects, all with involved logic that needed to be correctly ported and tested across multiple client conditions. This task was a major undertaking, but it could be parallelized across multiple developers, and by this point we'd attracted a growing developer community who were eager to get involved.

This led to our next big challenge: rigging up a development environment in those days was an involved process, requiring developers to bring up three separate services and two databases. We solved this problem by containerizing everything and providing Docker Compose automation to reduce the onboarding process to a single command. By doing so, we rapidly improved the project's iteration speed, attracting the contributions we needed and allowing us to launch our pre-alpha on top of Spine.

Once we'd implemented the bulk of the game logic, our next challenge became one of populating the world with its original launch content. We possessed the original source files for this content, but we needed to translate them into JSON (data) compatible with the Mongo database sitting behind our game logic server. We developed a tool called Regionator to do so, which our Geography team used to map out and piece together the vast majority of the 1987 launch world, over 2000 rooms in total.

By this point, much of Neohabitat was working, but the login process was still quite cumbersome, requiring users to navigate through numerous obscure corners of the original QuantumLink software. While this provided an authentic 1980s login experience, we felt that it would dissuade new users from joining in on the fun.

Enter Gary Lake-Schaal, a legendary Commodore hacker who managed to recompile the original Habitat client from scratch and wrote us a custom launcher to boot, complete with a custom splash screen and awesome PETSCII art. Gary's new client cut the login process down to 30 seconds and allowed us to build single-click client launchers for both Windows and OS X.

What's the future look like for NeoHabitat?

The Neohabitat community continues to grow, attracting over 100 unique users every month. We're planning some regular in-world events to promote the service, and we've created a Node-based bot framework to enable the development of interactive in-world characters.

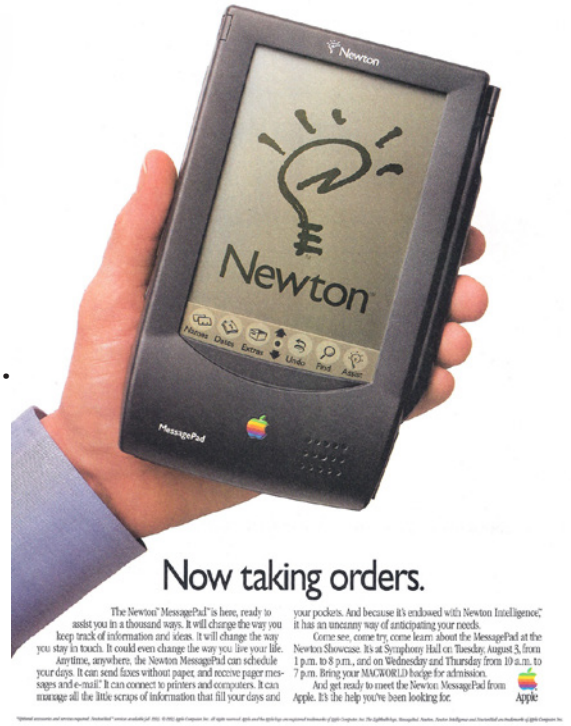
The MADE is also building a permanent exhibit within their museum, bringing Habitat to a whole new generation of players, and you'll likely see it at this year's GDC (Game Developers Conference)!

Thanks Steve!

HEAVY DUTY
ELECTRONICS IN INDUSTRY

Apple's Radical Departure
The Newton is a pen-input device that combines a fast, new CPU with a multitasking operating system in a sleek package that weighs less than a pound. At about 7½ by 3½ inches, it can fit into a jacket pocket (see photo 1). A lid folds back to uncover the 6- by 3-inch screen, which doubles as the digitizing surface.

Byte, July 1992



Announced at 1992's Summer Consumer Electronics Show in Chicago, the Apple Newton was ahead of its time...

...too far ahead.

Apple's CEO, John Sculley, called it a "Personal Digital Assistant", and the journalists present seem to have been in awe of the potential the Newton represented. A digital tablet that recognised handwriting? That could wirelessly send e-mail? That had an operating system that would support all kinds of third-party applications? It was extremely ambitious, but Apple wouldn't announce it if they couldn't do it, now would they? All we had to do was sit back, relax, and wait for the 21st century to roll in a few years early!

Unfortunately, Apple's eagerness to trumpet the Newton and pre-empt any potential competitors from stealing its thunder would prove to have been a serious mistake.


38 Special Report MACWEEK 03.01.93

PIE division moves away from Newton-mania

By Andrew Gore

In a pre-emptive strike last May, Apple single-handedly defined the nascent personal digital assistant market by offering a preview of its Newton technology.

The unveiling at the Consumer Electronics Show in Chicago stole headlines and ignited debate among pundits and potential customers alike. But since then Apple has been uncharacteristically quiet, even evasive, about its personal digital assistant (PDA) plans. When it announced a second PDA project in June — a multimedia player code-named Sweet Pea to be developed in collaboration with Toshiba Corp. — Apple offered virtually no details.

Last spring's enthusiasm in the media has given way to a more negative tone, with recent reports focusing on delays inside Apple's Personal Interactive Electronics division, the group responsible for Newton and the company's other consumer devices.

Many would-be competitors, including Apple spin-off General Magic Inc., have announced their own strategies to build PDAs. It seems without shipping a single product, PIE already has lived through the entire product line life cycle, from initial customer infatuation to disillusionment and division of the market by competitors.

Aware that its flagship product, Newton, had become something of a scapegoat for industry frustrations, PIE trotted out its latest notetaker prototype for a Newton "status report" at the Consumer Electronics Show in Las Vegas in January.

However, unlike last spring's initial Newton showcase, the event offered little in the way of new information, except a firm statement from Apple that Newton will ship by the middle of the year. Nothing was said of any other PIE project.

The only other product sightings have been "Newton under glass," a nonfunctioning prototype in a sealed case displayed at Apple's trade show booths over the last few months.

What follows is a survey of PIE's four strategic initiatives. Except where noted, Apple refused comment. PIE was the only one of the four Apple product-development groups that did not cooperate in this report. PIE officials said Gaston Bastiaens, who became the division's general manager in July, was not ready to give interviews.

▸ **Newton.** The Newton notetaker that will officially debut by June will resemble the prototypes previously demonstrated — the design hasn't changed much since May, according to Burt Cummings, director of marketing at PIE. It will still come in a sleek case with a serial port and a pen for input; an infrared link will allow point-to-point connections between two Newtons.

The handheld initial model, according to sources, will be followed by a larger device, about the size and shape of a clipboard, that will use the same operating system.

Some pieces of the originally planned PDA environment, such as a full communications stack that can support collaborative and wireless networking, will be missing from the first devices, sources said. These features reportedly will be added to future models.

Apple's marketing focus for Newton has shifted since last spring. Officials have downplayed talk about the consumer-electronics market, putting their emphasis instead on custom-forms solutions for business. This seems to reflect a realization that it'll take more than

This Newton prototype garnered Apple a lot of press. But when it didn't appear last December, praise turned to criticism.

MacWeek, March 1993

For over a year after Sculley's bold announcement the Newton remained an intriguing idea, a non-working mock-up displayed proudly under glass at one trade show, and another, then another. People began to wonder, and their concern was not without merit – the truth was, delivering timely handwriting recognition was a great deal more difficult than either Apple's engineers, or its marketing department – or John Sculley – had previously anticipated.

It was either terribly innacurate or terribly slow – in whichever case, it was simply...terrible. To make matters worse, the additional bold dream of wireless cellular-based connectivity was dashed against the rocks when Apple failed to persuade any major telecommunications company to roll out the infrastructure needed to support it – at its launch the Newton's communications options were limited to a 2400 baud land-line modem and an infrared port that allowed two Newton users to "beam" messages at each other, hardly revolutionary technology even in 1993.

To last longer than 15 minutes on a set of AAA batteries, the Newton needed a low-powered CPU and Acorn's RISC (Reduced Instruction Set) processors fit the bill. Acorn and Apple founded ARM to develop the CPU for the Newton, and while the Newton flopped, ARM would go on to build the CPUs used in mobile phones today.


ARM DIPS INTO APPLE'S P.I.E.

TECHNOLOGY originally developed by Acorn has been used in a revolutionary pocket computer from Apple Computer, the Newton.

The Apple Newton features the ARM610 Risc processor, developed by Advanced Risc Machines (Arm) Ltd, the chip manufacturing company jointly formed by Acorn, Apple and VLSI Technology.

The Newton heralds the introduction of a diverse range of products called Personal Digital Assistants (PDAs). The new hand-held device enables hand-written words and sketches to be transformed into clean type and graphics.

The new division formed to undertake PDA projects is called the Personal Interactive Electronics division (or Apple P.I.E!).

Features of the Arm610 processor include lower power consumption, very compact dimensions, improved performance by up to 40 percent via a write buffer and a new on-chip memory manager. The Arm610 is a descendant of the Arm3 processor, currently used by Acorn in the A5000, A540 and new A4 notebook computers.

Arm technology lies at the heart of Apple's Newton

Apple chairman, John Sculley, personally introduced the Newton to a gathering of journalists at the recent Consumer Electronics Show, which I attended in Chicago. Newton is said to be very much a pet project of Sculley's and he declared that PDA products would create a multi-billion dollar industry by the end of the decade.

Consumer electronics giant Sharp will manufacture Arm-powered Newtons for Apple in Japan and it will be developing an own-brand version for the Japanese market. Apple wants to license Newton technology to more third parties and if there are takers, Arm could once more become the most prolific Risc processor.

This prospect has been a major boost for Arm Ltd. This has resulted in Acorn's share price continuing its seemingly inexorable rise – heading for the mid-30p region at press-time, compared with 6p a couple of months ago.

Newton differs from existing portable or pocket-sized computers in that it has been designed from the outset as an intelligent device which can not only recognise hand-written input (there is no keyboard) but can help plan your daily routine and communicate with other devices via infra red and even cellular telephone links.

Newton makes use of an advanced object-oriented operating system, which is not compatible with either Apple Macintosh or Archimedes software. Newton's software development system has both C-like and artificial intelligence language features and is referred to as 'Dylan' in-house. Newtons are known as 'Newts' for short.

Apple says it is confident that Newtons will be ready for sale in the first half of next year.

Watch out for a special feature on the activities of Arm Ltd in the next issue of *BAU*.

Ian Burley

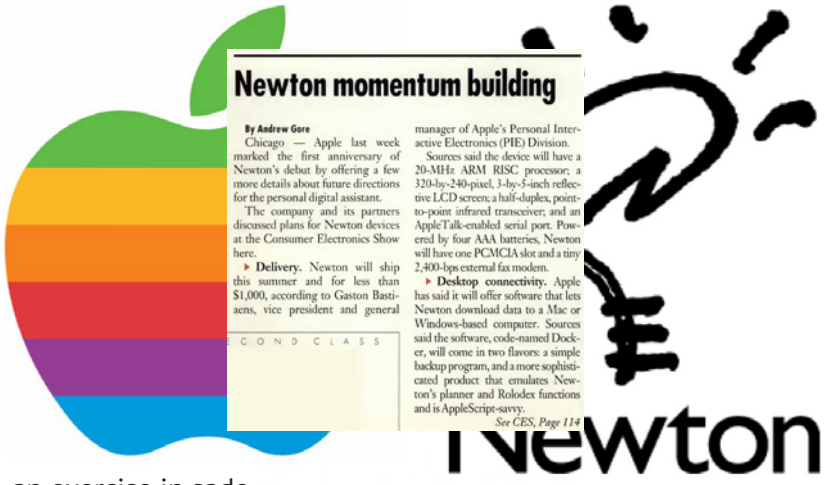
Personal data assistants make scribbles legible

Acorn User, August 1992

As a result of the preemptive multitasking of NewtOS, the Newton can use multiple handwriting recognizers simultaneously. Apple is planning to supply a printed-text recognizer, a graphics recognizer, and a pen-command recognizer that work together. They can arbitrate among themselves to make sure that the appropriate recognizer makes the best possible choice. In addition, Apple is working with Paragraph International in Boulder, Colorado, on cursive-handwriting recognition.

From the brief demo BYTE saw, the printed-text recognizer in the Newton is very capable. It can automatically detect that words written in a line go together and that several written lines make a paragraph. It doesn't need special input tools like boxes, combs, grids, and underlines. It also knows about the size and spatial relationship of letters and numbers so that it can correctly recognize complex algebraic equations or differentiate large and small text and display it in different font sizes. It can even recognize text written at an angle.

Byte, July 1992



Eventually Apple was placed in the position of having to release *something*, and the Newton MessagePad 100 made it into consumers' eager hands fourteen months after Scully had announced it at CES. It cost US$900 (US$1500 in 2018), but those who thought they were buying the future early were willing to hand over the dough, and 50,000 MessagePads were sold in its first three months on the market, in spite of savage reviews.

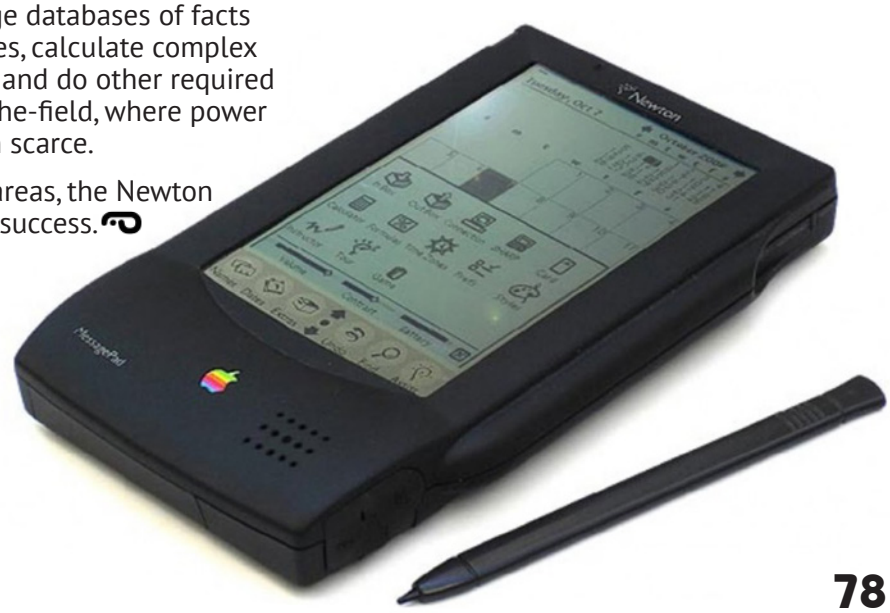
The Newton's RISC CPU was very good at knowing when to take a nap and conserve energy, and the battery life of the Newton was long when it was in such a state of hibernation, but if you wanted to do actually *do* anything you'd better have a spare set (or two) of AAA batteries on hand – and in the early 1990s, these batteries weren't cheap. It also took from two weeks to a frustrating two months for the handwriting recognition software to "learn", and in the meantime the user was forced to constantly correct themselves, an exercise in sado-masochism that grew old quickly.

While later Newton models got better at almost everything, its poor introduction had soiled its reputation permanently, and it struggled, eventually to be eclipsed by the Palm Pilot, introduced in 1996 by the developer of third-party Newton handwriting recognition software Graffiti, who decided they could do the hardware better.

Steve Jobs would finally kill off the Newton after his return to Apple in 1997, citing its slowness and his dislike of the pen interface. Apple would stay away from touch-anything until the iPhone.

Although the Newton was a flop as a "personal digital assistant", its portability and pen-based interface made it attractive for all sorts of professional use-cases, and it found a home in a number of industries, performing tasks such as checklisting, inventory management, logistics tracking, and the first digital signatures-on-delivery. It could also be used to store and reference knowledge databases of facts and figures, calculate complex formulas, and do other required tasks in-the-field, where power was often scarce.

In these areas, the Newton found its success.



First-generation Newtons to deliver E-mail features

Users will be able to send objects, text

By Robert Hess

Cupertino, Calif. — The Newton personal digital assistants Apple will begin shipping this summer will let users send messages around the world at the tap of a pen.

Known as Newton E-mail, the electronic-mail software is expected to be built into all versions of the new handheld device. It will work with the 2,400-bps modem attachment that will be shipped with the first Newton devices, as well as the more-advanced communications capabilities expected in later models.

To support Newton E-mail, Apple is reportedly establishing a dedicated host mail system accessible via SprintNet, a worldwide telecommunications network that provides local, toll-free access from most cities. An Internet gateway will let users communicate with virtually all other mail services.

Newton E-mail will let users transmit data objects such as memos and notes, names and addresses, calendar events, and to-do items. While viewing any of these objects, users will be able to select Mail from a menu or write, for example, "mail John Smith" on the screen. That will turn the object's contents into a message preaddressed to John Smith if that

See Newton E-mail, Page 116

Newton E-mail's Out Box dialog.

Macweek, June 1993

THE KEY

Think Guitar Hero was an amazing innovation? Then you've never heard of The Key.

Introduced at the 1994 Consumer Electronics Show, The Key wasn't entirely sure what it wanted to be when it grew up. It was firstly a "guitar synthesiser" – you could use it to play actual music by pressing the frets and "plucking" the fins that substituted for strings. Sound came out its built-in speaker, but it also had a MIDI-out port so you could plug it in to another synthesiser or record your jam on a computer.

But The Key's manufacturer, Lonestar Technologies, obviously didn't think that was enough. What this rather complex piece of technology would really be good for, the marketing department seems to have said, is playing air guitar!

And so, they developed a system whereby the air guitarist could connect The Key to a VCR, and then play a tape of music videos encoded with synchronised note information, allowing them to play along with the band, apparently either note-for-note Guitar Hero-style, or in The (same) Key, which at least allowed for a bit of creativity on the part of our fantasy rock star.

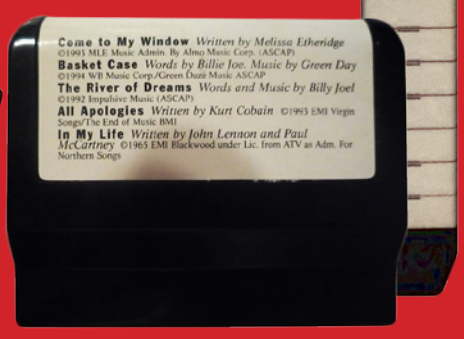
The Key also had cartridges available for it that contained MIDI-based arrangements of popular songs, which you could play along with, restricted to notes or key, or just free-form if you were any good. Its built-in voice-generator was apparently the same as in the Korg M1 – rather sophisticated for a "toy", if indeed The Key was a toy, we're still not sure.

> There's trouble in playland, though. If you don't happen to hit the notes in the right rhythm, the results can sound pretty strange.

But at US$5000 the one thing we are sure of is that The Key was a pretty expensive toy. Guitar Hero was much, much cheaper!

> Now imagine yourself in your living room, sitting on the sofa. A Guns 'N Roses video is playing on the TV. You're holding some kind of futuristic plastic guitarlike gizmo. As you pluck these weird finlike things where you'd expect strings to be, it plays whatever note Slash is playing at that instant.
>
> Electronic Entertainment, September 1994

Sadly, The Key wasn't given much of an opportunity to make the case for its astronomical price – Korg apparently declined to continue supplying its audio hardware. The Key was subsequently redesigned to use different (and cheaper) voice generators (and had a much lower US$600 price), but the result was apparently far inferior and few were sold.



PiPPiN

More fundamentally, although aiming to be all things to all consumers, the Pippin could end up as an unacceptable compromise designed by committee. As a game machine, it can't compete with the PlayStation's stunning graphics. As a home-learning multimedia player, the Pippin is too much of an unknown quantity for most developers to experiment with. As a computer, the Pippin suffers from the lack of a hard drive. And as an Internet-access device, it's limited by how well typical Web pages can be rendered on standard TVs. Although the Pippin has special hardware for improving the appearance of fonts, text-heavy pages are still more difficult to read and navigate on a TV than on a computer monitor.

MacUser, April 1996

Apple and Bandai's joint console venture, the Bandai Pippin, was unveiled properly at E³. The dark grey, Power PC-based console is being pitched as an all-round entertainment/Internet machine, scarily like Philips' ill-fated CDi console. The difference is that the Bandai machine is very powerful and has a ton of groovy features, such as a built-in Modem (Apple's Geo Port) and a 603 Power PC processor (used in the *Virtua Fighter 3* arcade board!). Pippin could be cool, so we'll watch out for it when it's launched here in the fall. Videogames, August 1996

Pippin is a major departure for Apple – it's the first time the company has licensed its widely respected Macintosh technology to a thirdparty. The deal with Bandai is a clear attempt to gain ground in the home market that has so far eluded the Cupertino-based computer pioneer.

Edge Magazine, March 1995

'Bandai's strength in the entertainment industry paired with Apple's leadership in easy-to-use multimedia products will provide customers with an unparalleled entertainment and educational tool'

Satjiv S Chahil, Apple New Media Group

– Apple Spokesperson

"We have a lot of admiration for Sega and Nintendo and we don't, by any stretch of the imagination, expect them to go away. But if (consumers) want something that can grow as a platform, they should choose Pippin."

Following the hiring of enthusiastic "games evangelists," a dedicated game machine from Apple has been rumored for a long time. Now — after much speculation — the Cupertino, CA company has announced 'Pippin,' a games/edutainment/multimedia system set for release in late 1995. Based on a 4xspeed CD-ROM drive and a PowerPC 603 microprocessor (similar to 3DO's M2 accelerator, also due for release later this year), Pippin is essentially a stripped-down Apple computer, aimed at being affordable and uncomplicated enough for the mass market.

Next Generation, February 1995

But as 'Pippin' targets the 'family' market, core gamers may find themselves left out in the cold

The mid-1990s press was cautiously optimistic about the Pippin, but had concerns about the viability of yet-another "multimedia" CD-player in a market that had already dismissed prior attempts, such as the Philips CD-i...

GADGET GRAVEYARD

FAILED ELECTRONIC GIZMOS

Gadget Graveyard

By Paul Monopoli

The mid 90s saw a shift in the console wars, with the Sony Playstation reigning supreme over former heavyweights, Nintendo and Sega.

The Saturn was released to disinterested gamers, and Nintendo were making what can only be described as 'interesting choices' with their releases. The 1995 CES saw the debut of the Virtual Boy, which promptly flopped. The Big N's Ultra 64 was unveiled at the same show, but used cartridges at a time when developers were looking to make use of the mass storage offered by CDs.

While each CES will see announcements from the big names in video games, there are also a few surprises that the public never sees coming. Microsoft, a major player in the home computer market, unveiled the XBOX at the 2001 show to an unsuspecting public. It became one of their biggest success stories, and the lineage of that original console is still alive today, with the XBOX One X. It's a lesser known fact that Microsoft's biggest home computer rival had already dipped their toes into the console market years earlier, but unfortunately the end result was a sour Apple.

Steve Jobs was forced to leave Apple Inc in 1985, and while the company continued to deliver quality products, including Macintosh Classic and the Powerbook, it also made some questionable choices. A tech giant during the 70s, 80s and early 90s, Apple was becoming better known for its failures than its successes. Commentators would mock the company, ignoring the still successful Macintosh line, and instead focused on underperforming products, such as the Apple Newton. Steve Jobs would be brought back into the Apple fold in 1997, but before that Apple had another major failure on its hands.

The 1996 CES saw the debut of the Apple Pippin, released in partnership with Japanese toy giant, Bandai Entertainment.

Bandai, themselves, had a questionable track record with video games, having released the overpriced Playdia multimedia home entertainment system two years prior. The Playdia suffered from a lack of third party support, with Bandai themselves releasing 99% of its software catalogue. It was quietly discontinued in 1996.

Apple's partnership with Bandai saw the US giant developing the hardware, while their Japanese counterpart manufactured, marketed and distributed the console. At its core the Pippin was a cut down PowerPC Macintosh, with 5MB of RAM, a 4x CD-ROM drive and a 14.4k modem. The device was released with a controller, power and video cables, and a small library of software to get the end user started.

Additional accessories that could be purchased included a keyboard and drawing tablet, wireless controller and 256MB optical drive. Due to the Pippin being a Macintosh Lite, adapters were released that allowed users to attach Mac devices to the Pippin and vice versa.

The Bandai marketing team decided to release the console with different names in different territories. In Japan the Pippin was released as the Atmark, while in the US it was called the @world (pronounced Atworld.) While the front of the packaging shows that it is "Advanced Technology by Apple Computer", the back tells us that it is distributed by "Bandai Digital Entertainment."

The Atmark was released in white/beige, the same colour being used for the Macintosh line of computers, while the @World came in black.

The price announced at the CES launch was a wallet-busting US$599. At the same show Nintendo announced their Nintendo 64 console would launch at US$199, leaving many commentators to doubt the success of Apple's product. With Sony and Sega already established and Nintendo about to launch, was there any room in the market for a player 4 in the console market? Particularly one with a checkered history of hits and misses in the home computer market?

One of the biggest features of the Pippin was its ability to browse the Internet, and Apple partnered with Spyglass to create the @World Browser. This was designed to make browsing available on your TV, however the televisions found in many households at the time didn't have the required resolution to display high res webpages. This resulted in a clunky and visually unappealing browsing experience. Also, the supplied 14.4k modem just wasn't sufficient to deal with the data requirements of the late 90s internet user, who demanded 28.8k or higher.

Aside from the high price and poor browsing experience, it seems that Bandai had not learned their lesson from the Playdia launch two years prior. The software library for the Pippin was tiny, with many third party developers sticking to the familiar Nintendo and Sega brands, or jumping on the successful Playstation bandwagon.

Along with all of this, commentators at the time had difficulty establishing exactly what the Pippin was. It was a cut down Macintosh computer with a controller. So was it a computer or a console? The controller featured a trackpad that could be used in place of a mouse, and accessories included a keyboard and disk drive. Some reported that it was an upcoming games machine, while others cryptically referred to it as an entertainment machine. Others decided against using a term to describe the machine, referring to it as a "product."

The Pippin sold poorly upon release, and while it is hard to find a source that provides accurate sales figures, online commentators seem to agree that 42,000 units were sold. It is estimated that approximately 100 games were released for the system, with many of them being declared shovel ware. As with the Playdia before it, many of the programs available were 'edutainment', though the Bungee title Marathon stands out above all others.

A first person shooter in the vein of Doom, Marathon 1 and 2 are highly acclaimed titles that didn't see mainstream success until their debut on Microsoft's XBOX as Halo. It took Apple's main competitor to make Bungee the success it is today. The original games are clunky and awkward to control on the Pippin's 'Applejack' controller, and are best played on a Mac.

After the failure of the console stateside it was rumoured that American @World stock was being returned to Bandai in Japan. Indeed, the occasional black Pippin can be found on Japan Yahoo Auctions and Japanese retailers such as 'Mandarake' occasionally have them in store.

The final nail in the coffin for the Pippin was the return of Steve Jobs. In 1997 Apple restored their former founder to CEO status, a position he retained until a few months before his passing in 2011. Jobs rebuilt Apple from a struggling former IT leader to the iGiant that it is today, ditching the products that were losing money. This included the Pippin, which is now regarded as **one of the worst products of all time. Boo!**

Stewart Cheifet is an American television presenter best known for his work producing and hosting the 1983-2002 PBS series Computer Chronicles, which covered the Consumer Electronics Show on multiple occasions. Paleotronic reached out to Stewart to ask him about his experiences as a journalist covering CES.

Firstly, what was it like attending your first CES?

My first CES was in 1990. My frame of reference was the COMDEX show which I had been attending for many years prior to my first CES. Comdex was a very corporate, button-down trade show – featuring servers and routers and security software and storage solutions, etc. It was not very consumer oriented.

So I was delightfully shocked when I went to my first CES – it was like walking into the world's largest toy store – at least for someone like me who believed a gadget without a battery – or a least an AC adapter – was not really a grown-up toy.

CES was also different from COMDEX in who the attendees were. While at COMDEX most people wore suits and ties, this was definitely a scruffier crowd – consumers, not just wheeler-dealers.

Also, CES featured lots of little guys – small startups with quirky products that would likely never make it to market. COMDEX was all about the biggies – IBM, Intel, Compaq, Microsoft, etc. But that was the fun of CES - guessing which crazy ideas might actually turn into successful products.

Did the atmosphere change in later CESs? Some Computer Chronicles segments make it seem like an arcade, others very business-like. Was there a trend away from business hardware / software and toward video / computer gaming, or was there always a diversity?

The atmosphere definitely changed. In my first CES shows, it was more a gadget show and an appliance show. You really didn't see many computers or computer products. Lots of car stereos, massage chairs, phones, radios, camcorders, TV sets, etc.

As computers matured and the market broadened from just business use to home and personal use, CES morphed into a computer trade show. And, yes, gaming became a bit part of CES – Nintendo and Sega were big exhibitors now, game software and game consoles were all over the place, and slowly mobile and wireless gadgets took on an increasingly large role.

There was still a business side to CES but that focus was largely on PCs and PC peripherals, as more and more consumer oriented exhibitors moved from COMDEX to CES.

What were your favorite presentations, launches and / or keynote speeches at CES?

In the early days of CES there were very grand exhibits – gigantic booths – you couldn't really call them "booths" – with live music, live performances, dancing girls, etc. So just the show biz aspect of CES was lots of fun. There were magicians, roaming "street (aisle?) performers" trying to lure you into booths. It really was a big party atmosphere. Even if you didn't care about consumer electronics products, CES was a great show in the broadest sense of that word.

So my favorite presentations, as a TV guy, were the Broadway style big productions put on by the major company exhibitors. There was also the phenomenon of what was known as the "booth babes" - attractive female presenters who had memorized a script about the products being pitched but would tremble if you asked them a follow-up question about the product.

Regarding keynotes, as CES matured and became more a computer show, my favorites were the ones given by Bill Gates. I think Gates probably held the record for a while as the most frequent main CES keynoter. I always found his presentations thoughtful and packed with useful information, going beyond just pitching MS products.

Of course the most famous Gates keynote was the one that flopped. At the 2005 CES, Gates was doing a demo of the new Windows Media Center and every presenter's nightmare happened – the demo crashed. I should add that I saw many crashed demos at CES!

Which were your favorite products or software? Were there any that you knew when you saw them they were going to be flops? What about successes? Why?

I would say that most of the newly introduced products had failure written all over them. After all, that was the point in CES – show off what you thought was the greatest new consumer electronics idea and then wait for the market reaction. It made more sense to fail at CES than to fail later at a much higher cost.

I think the biggest apparent flop in the making was 3D TV. The price was high, the goggles experience was uncomfortable, and the content simply wasn't there. It was great fun to think about, but it seemed apparent that 3D in the home was not going to happen soon without some major improvements and 3D would remain a theater experience for some time.

My guess at one big success turned out to be right – in the aftermath of Napster, and the many subsequent efforts at legal music sharing, it seemed clear to me that there was a huge market for downloadable music and portable digital music players. That technology was very hot at successive CESs and quickly improving with more sophisticated online options and improved players starting with the iPod and culminating with the iPhone and other smartphones.

There were other launches that looked like sure hits to me, or at least the technology that would eventually support new successful products.

In the mid 90's, more than 20 years ago, I saw products that were not quite mature but paved the way for future successful technologies. Before the Nintendo Wii and Microsoft's Xbox Kinect, there were demonstrations of early game interfaces that used body motion to control game characters. I thought this technology was a winner.

Way back then there was also the hint of wearables, with the early Pebble watch and the Timex DataLink watch.

The early AT&T Screen Phone was certainly the precursor to Skype and today's video chat apps.

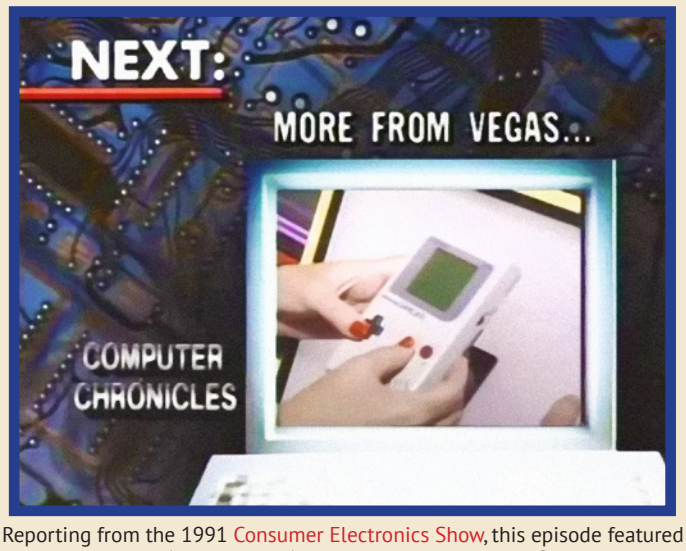
The roots of the TiVo and the DVR revolution were also shown at CES in the mid 90's such as a Zenith product that let you store TV video on a hard drive and products from Time Warner and Silicon Graphics that did the same thing.

Which software or products never made it to market that you really wish had?

In the gaming arena, there used to be great software titles that required players to think and plan rather just kill people. Somehow the game market took advantage of the improved graphics, audio and video and focused increasingly on violent first person shooters. I can understand that – when I first saw Doom, probably the first shooter with incredible graphics and speed, I was wowed. It was amazing that computers could now process information that fast to offer that kind of real-time realism. So I loved what the technology enabled but was disappointed at how it shifted the gaming market into more violent games.

The best game I ever saw at CES was a fantastic simulator called Robot Wars. This was a shooter but not real-time. You programmed your robot with various offensive and defensive strategies and put it out there in the arena to battle against bots programmed by the computer. You then hit "play" and watched the results of your programming strategy. Primitive graphics, but a brilliant game and learning tool.

On the other hand, the use of multimedia in action games was totally impressive. Titles like Grand Theft Auto and today's sports simulations for consoles, like NBA 2K, are just brilliant uses of the technology.



Reporting from the 1991 Consumer Electronics Show, this episode featured an interview with Atari founder Nolan Bushnell discussing Commodore's CDTV, and a look at Photo CDs, Nintendo's Game Boy, the Sega Genesis and Game Gear, and much more. The Computer Chronicles also covered CES in other years, including 1993, 1994, 1996 and 1997. Stewart has made all of the Computer Chronicles episodes available for free download on the Internet Archive at archive.org and we encourage you to give them a look!

"This is Stewart Cheifet reporting from the Consumer Electronics Show..."

In your experience, which product launches were attendees the most excited for? Were they right to be enthusiastic about these products, or did they flop?

E-books made a big splash when they first came out and there was a lot of excitement about the potential, but the early readers were clunky and, most importantly, not well integrated with the software. So most of the early e-book readers flopped. It was only when Amazon came out with the Kindle and the Amazon on-line bookstore that e-readers really took off. I am amazed today to see, as I travel, that the vast majority of travelers are reading e-books rather than physical books.

There was also a lot of excitement when broadband and improved graphics, video and animation capability enabled developers to build virtual stores and virtual malls to make the online shopping experience more like the physical world. There were several clever approaches to doing this and simulating the serendipitous mall shopping experience, but that proved to be less important to users than the clear clean look of Craigslist or Google search. Amazon figured out the winning formula realizing that ratings, user reviews, easy returns, speed and free shipping were more important to consumers than elaborate graphics.

What were some of the weirdest products or software you saw demonstrated at CES?

The weirdest product by far was something called PAN, the Personal Area Network, from, of all places, IBM. This was a network whose nodes connected by touch. So if you have two people, each connected to a computing device, the PAN can be used, for example, to transfer information such as business card data from one person to another simply by shaking hands.

The PAN can also be used to move data from a person to an object they touch such as automatically sending a phone number or credit card information to a cell phone by touching it. The technology uses the salt in your skin to move the ones and zeros from one person to another. The demo made a point of explaining that even a kiss could be used to transmit data.

The most bizarre aspect of the demo was the assertion that even a dead body could be used to transmit data on the PAN since the salt stays in the skin even after death!

The technology was actually developed at the MIT Media Lab. Of course Bluetooth sort of instantly obsoleted the PAN idea. Except, I guess, for the dead people!

What were the most colorful, interesting or notable characters you met or interviewed at CES?

For me the most interesting character I met at CES was Nolan Bushnell, one of my tech heroes. He, of course, is famous for creating the game Pong, starting Atari, and developing the Atari 2600 game console. As someone who still owns an Atari game console and its predecessor, the Magnavox Odyssey game system, for me this was a visit to the temple of gaming.

Bushnell, now 75 years old, had the most insightful understanding of the technology and game industry I had ever come across. Bushnell is in the CES Hall of Fame for his contributions to consumer technology.

COMDEX (an abbreviation of Computer Dealer's Exhibition) was a computer-centric trade show held in Las Vegas from 1979 to 2003. COMDEX had a corporate focus, and attendees were typically business-people who were looking for technological opportunities to increase their companies' profitability.

However, during the early 1980s, home computer manufacturers such as Atari and Commodore shifted their focus to the Consumer Electronics Show, and as business computer manufacturers began to recognise the growing consumer segment of their market, they gradually increased their presence there also.

The burst of the dot-com bubble caused them to carfully reconsider their spending, and given the choice of attending CES or COMDEX, COMDEX lost. IBM, Compaq and Apple, among others, pulled out around 2000, and by 2003 the number of exhibitors and attendees had dwindled. In 2004 COMDEX was permanently cancelled.

> "The weirdest product by far was something called PAN, the Personal Area Network, from, of all places, IBM. This was a network whose nodes connected by touch.
>
> The most bizarre aspect of the demo was the assertion that even a dead body could be used to transmit data on the PAN since the salt stays in the skin even after death!"

Nolan Bushnell was at 1991's consumer electronics show promoting Commodore's multimedia CDTV set-top box.

But even the smartest guys sometimes make mistakes. Back in 1976, a young entrepreneur named Steve Jobs was trying to find funding to start up his new computer company called Apple, He went to Bushnell and offered him one-third of the company if he would invest $50,000 in Apple. Bushnell turned him down.

CES was, after all, a trade show; were you aware of any notable deals that went down at CESs you attended?

The short answer is – no. I was covering CES as a journalist for my TV show and focused more on cool new gadgets rather than on the business aspects of the show.

In general, COMDEX was more the trade show where deals were made. The exhibit floor there was full of these little carpeted cubicles where deals were negotiated. CES seemed more about buzz and PR, which could then eventually lead to deals.

CES was unique when it started in being open to the public, not just industry people. That gave CES a rather unique vibe compared to other tech trade shows.

Finally, do you have any good anecdotes about CES? Any great parties you attended, or free stuff exhibitors gave away?

I think the weirdest part of CES was the adjacent Adult Entertainment Expo (AEE), which has always been held at the same time as CES and often in the same hotel or convention center.

In the early days, one often saw some of the best technology on display at the AEE since their products demanded speed, great audio and video and certainly innovative Internet technology and e-commerce competence.

The funniest part was roaming the aisles of the AEE and bumping into colleagues who sheepishly noted that they were "just checking it out as a curiosity".

Regarding great parties, zip. As a TV journalist working twelve-hour days and running around almost 2.5 square miles of exhibit floor space with camera equipment, my favorite party was a quick dinner with my crew and back to the hotel to review what we had shot that day and prepping for the next day's marathon.

Regarding free stuff, I never saw any tchotchke worth waiting in line for. I was always amazed at how many sophisticated and well compensated tech execs would stand in a long line just to get some useless little goodie that was probably worth less than a dollar. The explanation was usually, "I'm just getting this for my kid".

"Free" is still a powerful word!

Thanks Stewart for bringing us your memories of CES, and a big "thank you" for bringing the world the Computer Chronicles!

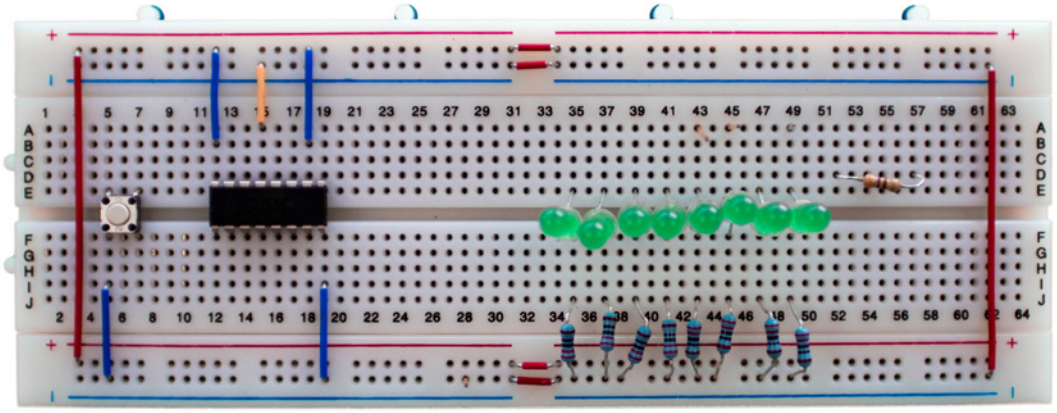
Computer Chronicles (titled 'The Computer Chronicles' from 1983 to 1989) was a half-hour television program broadcast on the US Public Broadcasting Service.

Created by Stewart Cheifet, then-station manager at the College of San Mateo's educational television station KCSM in 1981, it documented the rise of the personal computer market.

Initially a local weekly program hosted by Jim Warren, founding editor of computer programming journal Dr. Dobb's and co-founder of the West Coast Computer Faire, it was picked up by PBS and began to broadcast nationally in late 1983.

Later, Cheifet would take over hosting duties, frequently co-hosting the episodes with computing luminaries such as Gary Kildall (the inventor of the CP/M operating system and founder of Digital Research, which developed the GEM desktop used in the Atari ST) and George Morrow, who championed the S-100 bus used in early microcomputers such as the Altair. Other co-hosts included Paul Schindler and Wendy Woods, who provided software reviews and product reports.

Despite its popularity, Computer Chronicles was cancelled in 2002. However, it has since become a valuable resource for studying computing history in a contemporary context. Its retro music and graphics are also very cool!



THE BREADBOARD

In *Radio Waves*, we learned a little bit about how transistors work. But what exactly can transistors *do*? Well, why don't we have a look at an example...

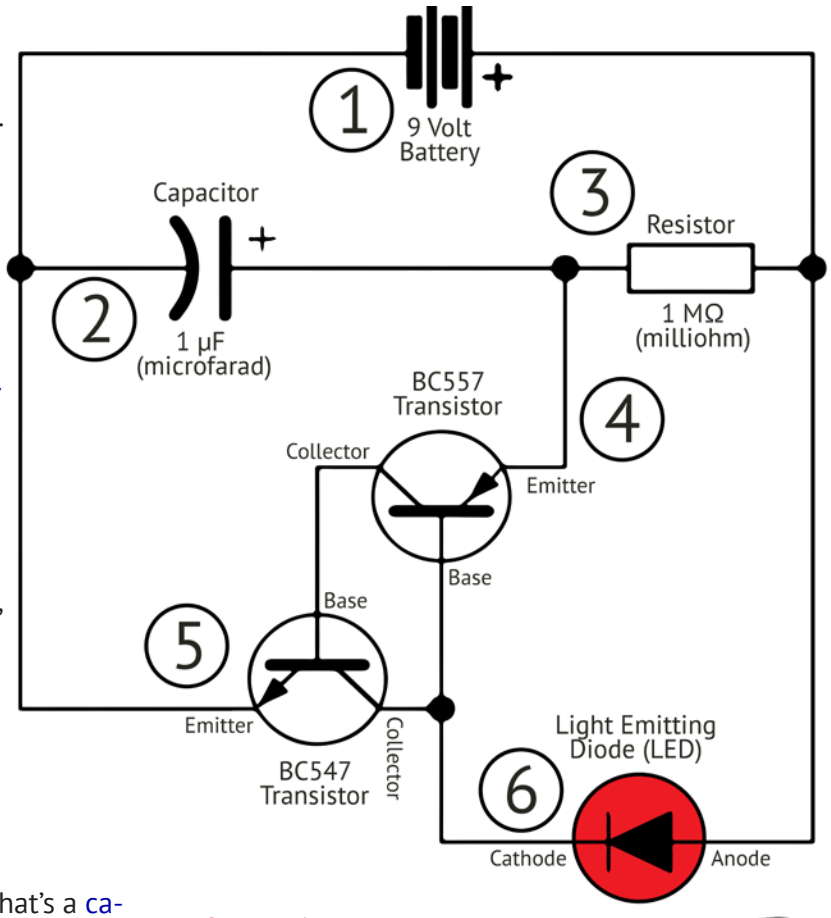
The diagram on the right describes a simple circuit that causes an LED to flash on and off, using two transistors.

It looks complicated, but it's not, really. Don't worry, we're going to explain everything we're about to mention in greater detail, but please bear with us for a moment.

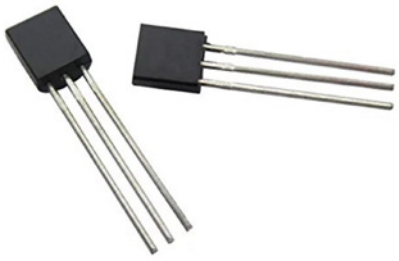
In this circuit, the 9-volt battery (1) charges the capacitor (2) at a rate regulated by the resistor (3).

Once the capacitor (2) is "full", it discharges, but the resistor (3) prevents current from returning to the battery, and it instead flows into the emitter of the BC557 transistor (4).

This causes the BC547 to "open" momentarily, allowing a burst of current to flow to the LED (6), lighting it up.



"But what's a resistor? And what's a capacitor?" The explainer box to the right describes these components and how they work. While they perform vital operatrions in our circuit, what we're most interested in today is the transistors.



Capacitor: A capacitor stores energy in the form of an electrostatic field. It works by separating two conductive plates with an insulating material called the dielectric. The capacitance (amount of energy that can be stored) of the capacitor is determined by the size of the plates, and the distance the plates are separated by. Once the charge reaches the storage "limit", it discharges across the dielectric and is released into the circuit. The 1 µf capacitor used in the flasher looks like this:

Resistor: A resistor impedes the flow of electricity in a circuit. Resistors commonly work by increasing the amount of distance current has to travel, containing hundreds of windings of extremely thin copper wire around a ceramic core. The conductivity of the copper wire itself can also be changed by adding another metal, such as nickel, to the copper, creating an alloy. The amount the resistor "resists" is noted using coloured bands on the body of the resistor. We'll get into just what exactly these bands mean in another issue, but for now, the one milliohm resistor in our LED flasher looks something like this:

Electronics Explained & DIY Projects

Rather than simply having a positive and a negative side, bipolar junction transistors (like the ones used in our LED flashing circuit) have three "terminals" known as the Base, the Collector and the Emitter. The Base connects to a layer of material that separates the other two terminals. For our purposes here, we're concerned with the ability to use these transistors as switches.

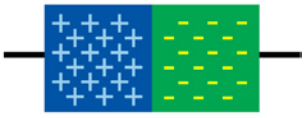
When the increased current from the discharging capacitor flows to Emitter of the the BC557, a PNP transistor (4), it is sufficient enough to jump across the Base and flow out the Collector. This current then flows into the Base of the BC547 transistor (5). The BC547 is a NPN transistor, that is when the Base is charged with sufficient current, it no longer impedes flow between the Emitter and the Collector.

The net result is that current is allowed to flow to the LED (6), and it lights up. But once the capacitor finishes discharging, the transistor "switches" close, and the LED turns off. The capacitor builds up a charge once again, and the cycle repeats.

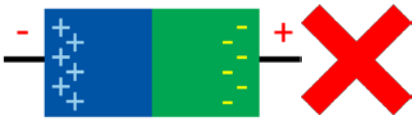
By swapping the resistor and the capacitor with ones of different values, you can vary the amount of time the LED is on or off.

LEDs (light-emitting diodes) do all sorts of tasks, from lighting the numbers in digital alarm clocks to forming the pixels on modern TV's. But to explain how they work, we need to start with the humble diode.

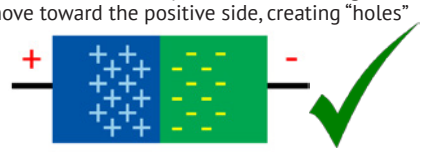
Without getting too complicated, a diode is made up of two segments of differing types of material, one with extra negative electrons, and one with extra positive electrons.



The positive electrons are attracted to the negative side of the circuit the diode is connected to, and vice-versa. If negative is connected to positive, current cannot flow.



But if positive is connected to positive, the free negative electrons move toward the positive side, creating "holes"



the positive electrons can move through on the way to the negative side. Current flows. But as positive electrons fall into the negative "holes" they also release energy, in the form of photons. By using materials that force the electrons to "fall" farther, the frequency of the released photons can enter the spectrum of visible light.

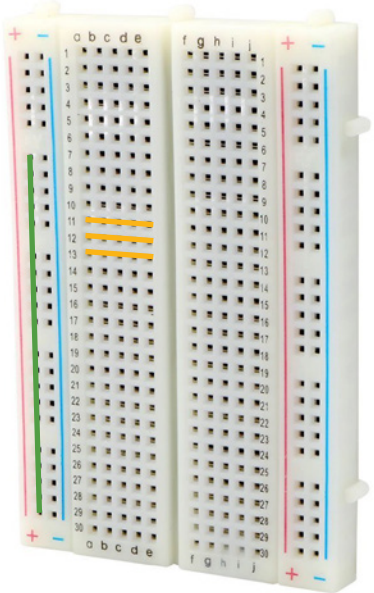
What is a breadboard?

Back in the days of early radio, amateur radio technicians would build equipment by nailing bare copper wire or strips to a board (sometimes one previously used for cutting bread, as these were a convenient size), then solder (connect using a conductive metal alloy that has a low melting point) components to them.

While you could similarly fasten the components in our LED flasher to a wooden board using hot glue (although not the capacitor, since its outer casing could be damaged by it –you would probably be better off using staples to fasten the terminals to the board) and then solder wires between them, that would be messy in several ways, and it would be difficult to experiment by exchanging components. In 1971, Ronald J. Portugal developed a solderless solution to prototyping, now referred to commonly in the field of electronics as a breadboard.

Breadboards consist of a series of holes into which wires or the terminals (legs) of components can be inserted. The holes in each numbered row on either side of the center ravine are connected by "terminal strips", allowing for components to be wired together using horizontally adjacent holes. The vertical "power strips" on the outside edge are used to provide current to circuits mounted on the breadboard.

Breadboards can be bought on-line for around AU$10, with a power supply and a collection of wires.



A typical breadboard. The orange lines highlight the terminal strips, and the green line highlights a portion of a power strip. Usually you need to connect the power strips on either side by running a "jumper" wire between them (one between the positive strips, and one between the negative strips.)

A breadboard makes it simpler to experiment (and learn) by allowing you to exchange components in a circuit easily.

The Sliced Salami Society and the Case of the Cryptic Computers...

by Melody Ayres-Griffiths

"Jamie! Where on Earth has he gone now?"

The not-quite-a-teenage boy subsequently materialised out of nowhere, panting. "They have a million games in the Nintendo booth!" To Jamie Silicon, anything over ten was "a million". His older sister (by two years!) Sarah glowered at him. "This is no place to be running off. Father will be quite upset with me if I lose you."

"Nah, you can't lose me, Sis," the boy grinned. "You're stuck with me!"

"Potty!" demanded Pippin, the three-year-old's face beginning to contort with discomfort. Sarah scowled at Jamie as if to say "you wait right here", and then took Pippin's hand and began to lead her youngest sibling to the washroom. Jamie, of course, did not comply, and was gone as quickly as he had appeared.

Who could blame him? The 1988 Winter Consumer Electronics Show in Las Vegas had everything a young boy could ever want to play with. There were a variety of video game consoles, home computers, electronic toys, TVs, stereos, gadgets, robots… the list went on and on. He was soon fiddling about with an Atari ST, poking about in the files on its twenty megabyte hard disk, when he opened one that quickly soured his jolly mood.

"Someone at this event is going to die," the text file read. "Clues are hidden inside various devices exhibited here. If you can find them, you can decipher who my target is and stop me. It's only sporting I give you, whoever you are, a chance. But I don't think you can. So I am not worried."

"The file deleted itself after I read it!" Jamie added, after reciting the message to his sister. No matter, Sarah concluded, the Sliced Salami Society was on the case again.

Their father, Steven, ran a computer store in their hometown of Schenectady, New York. He changed his last name to Silicon as a marketing gimmick before he met the children's mother. Now, if you have a name like Sarah Silicon, and your father's TV commercials air several times each day on several channels, you can be certain people are going to ask you about computers. And they did, a lot.

There was old Mrs. Hendrikson who wanted to know if a computer could help her manage feeding, medication and veterinary check-up schedules for her thirteen ageing cats (it could.) And Mr. Humphries, the local mechanic, who wondered if he could check his parts supplier's inventory without having to talk to Joe the Sales Guy who drove Humphries crazy (he could.)

Where other children babysat and mowed lawns, Sarah had made a business out of solving people's problems with computers, and called it the "Silicon Siblings" (even though Jamie mainly carried things and Pippin mostly sat and played with his imagination.) But sometimes, people had deeper issues that needed answers. Criminal issues.

Their first "case" involved the caper of the missing salami. The owner of the local deli was perplexed by the increasing loss of his prized luncheon-meat, and contracted the Silicon Siblings to finger the perpetrator. Sarah wrote a computer program that compared the amount of loss over time with the number of hours worked by each employee, and was able to identify the salami-stealing culprit.

Afterward, Jamie got the idea of creating a detective agency that solved local mysteries using his talent for getting into trouble… er… investigative prowess, and Sarah's skills with computers. But Jamie thought it needed a more intriguing name, and the Sliced Salami Society was born.

"Should we tell somebody?" asked Jamie, beginning to worry their father might be the target.

"Not just yet. There's no evidence and just your word for it, which let's be honest…"

"Gotcha."

"Hungry!" Pippin declared, tugging on Sarah's shirt and pulling in the direction of a hot-dog vendor.

"Not now, Pip," Sarah growled, an uncommon occurrence which silenced Pippin's stomach for the moment. "I need to start looking for clues."

"And I'll go see who looks suspicious," Jamie said, vanishing into thin air again. Sarah and Pippin began their search, moving from one exhibitor's booth to another, poring over their computers, consoles, watches, calculators - anything that could embed a message in it. Sarah searched their memory and storage, looking for anything unusual.

At first she couldn't find anything, only what seemed to be gibberish, and the only curious thing was that almost all the calculators on display at Texas Instrument's booth had been left displaying the number 15. Could that be the time of the assassination? 3 pm? (It was just after midday at this point.). That seemed a little too obvious. Sarah acquired Pippin a hot dog, and sat contemplating the possibilities. The computers held nonsense bits of data that didn't belong there, so they had to mean something. Maybe the number 15 was a simple cipher?

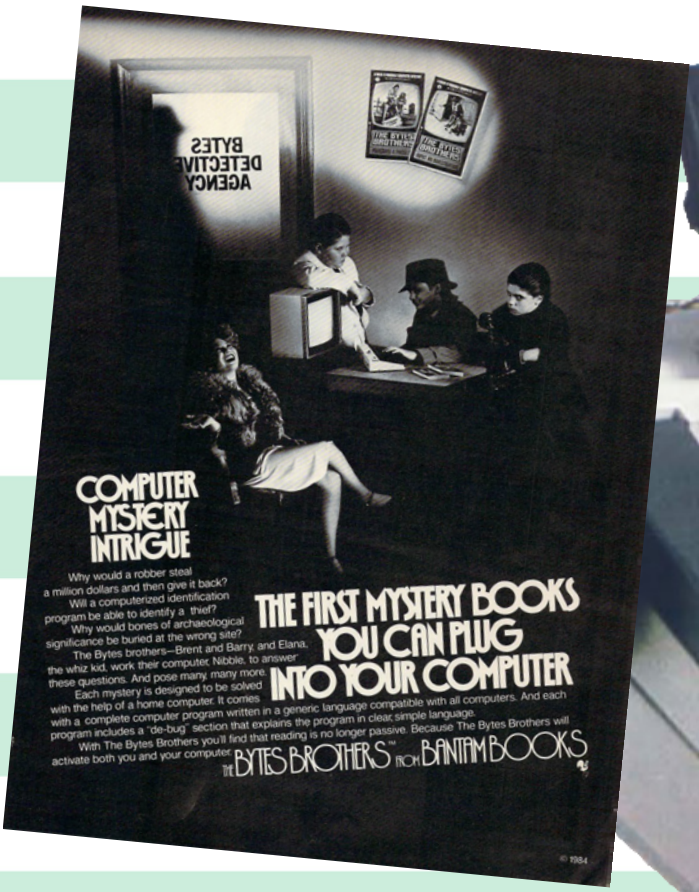
Text characters in a computer correspond with 8-bit numbers (from 0 to 255). This system is known as ASCII, an acronym for "American Standard Code for Information Interchange", a common way of associating characters with letters so that two computers made by different manufactures can exchange data, for example over a modem or a network. Sarah wondered, if she added or subtracted 15 from the ASCII values of the garbage characters, would they make sense?

They did. Adding 15 to the characters in the first message, discovered on a Commodore 128, yielded, "He can run, but he can't hide." The second message, found on a Tandy Color Computer 3, read, "Made in Japan" which was strange, since the computer was made in Korea. Finally, a third message, on an IBM PC firmly dedicated to business applications, declared "A Computer for the Whole Family!"

A security guard appeared, holding Jamie by the collar of his jacket. "Is this your brother?"

"Unfortunately, yes."

"I'm serious, mister," Jamie



The Sliced Salami Society was inspired by 1980s "computer mystery" books like the Bytes Brothers. These books often provided BASIC listings so readers could "solve" the crimes detailed in tbe stories on their own.

protested, "someone's going to get knocked off. I saw it on the computer. On the computer!"

"Sure, sure, kid. But the message vanished! Good prank. Not like we haven't seen it before. You troublemakers are all the same." He turned to the boy's sister, "Look, uh…"

"Sarah."

"Yeah, look Sarah, if your brother tries any of this stuff again I'll have to ask you all to leave. I can't have bored children causing panic, you know?"

"I completely understand, uhm, officer? He won't bother you again."

The security guard sighed and let Jamie down. He made the I'm-watching-you sign and then wandered off. "Did you find anything?" Jamie asked, nervously. "I'm really worried about Dad."

"I told you not to tell anyone. This is going to make getting any help much harder, once we have a suspect."

"So, no suspect yet then." Jamie looked despondent. "We should try to convince Dad to leave. Before it's too late."

"No. He won't believe you either. Besides, he needs to make that deal with Commodore. We can figure it out. I've found some clues." Sarah laid them out for Jamie.

"'He can run, but he can't hide', 'Made in Japan', and 'A Computer for the Whole Family'" Jamie recited quietly in contemplation.

"'A Computer for the Whole Family'", Sarah repeated, "hey, wait. Isn't the Nintendo called the Family Computer in Japan?"

"The Famicom," Jamie corrected her. "Yes! So the victim has something to do with Nintendo?"

"We need more. 'Made in Japan.' Well, Nintendo is a Japanese company, but there's no reason for the killer to leave a duplicate clue, is there? So it must mean something more."

"Maybe the victim is from Japan?" Jamie offered.

"A Japanese person connected to Nintendo. 'He can run, but he can't hide.' So, a Japanese man, then. I wonder what they mean by 'he can run'…"

"There's this new thing for the Nintendo where you can play a game by running on this pad you put on the floor," Jamie interrupted with visible excitement. "I'll be right back!"

"You're not supposed to go off on your own…" But Sarah was too late. It wasn't long before the security guard returned with her brother.

"Look, Sarah was it? I told you that you needed to keep a leash on him…"

"I found it!" Jamie interrupted. "It's called 'Family Fun Fitness' and it's by Bandai…"

"I don't know what you're up to, but I don't have the patience for…"

Sarah looked hurriedly through the CES schedule. "The founder of Bandai, Naoharu Yamashina, is speaking at…." She couldn't believe it: "3 pm!"

"Look, Mister Security Guard… what's your name?"

"John."

"Look, John," Sarah implored him, "we're private investigators. Here's our card." She handed John a Sliced Salami Society card, which he glanced over ("The Little Shop at the rear of Thirteen Thistle Street", "Algorithmic Solutions For Every Occasion") and promptly threw on the floor, shaking his head and trying not to laugh.

"Look, I know you think you're trying to help, but I'm telling you, you kids just have overactive imaginations. Now, I'm not going to kick you out, but I am going to take this boy here, and lock him in a small, windowless room with no Nintendo until your father comes and gets him. I'd lock you all up, but that little one looks like a crier." The guard gestured towards Pippin. "Hope you have a good time with the rest of your day. And no more conspiracies!"

John the security guard hauled Jamie off to his windowless prison, and left Sarah and Pippin (or at least Sarah) to try to stop the assassination of an elderly Japanese toymaker that was certain to occur in just under one hour's time. But how?

"I do not fear," Naoharu declared, dismissing Sarah's concerns. "These men, they are cowards. They, what is that phrase you Americans say, 'talk a big talk', but never follow through." Sarah went to interject, but Naoharu placed his hand on her shoulder, "I appreciate your concern. But it is nothing, you will see. I must go, now." Sarah nodded, accepting that he would not be convinced, turned and walked away. It

was over. There was nothing she could do.

"Introducing the founder and President of Bandai, Naoharu Yamashina!" an announcer cheered through the loudspeakers. "Let's give him a big Las Vegas welcome!"

"That's your cue, Mister Yamashina." The stage director pointed through the curtain. "Wait, what?" she said into her headset microphone, "I'll be right there." She walked off, leaving Naoharu to contemplate his fate. What if the American girl was right? What if going through that curtain meant accepting an invitation to his doom? But cancelling his appearance could be seen as a sign of weakness back in Japan. The wolves on his board of directors were already howling for him to step down. No, he must go.

"Potty," came the voice from beneath him. "Now. Potty!"

Naoharu looked down to see a small child. "I cannot…" He looked around, and there was no one to help him.

"Potty!" Pippin started to cry. "POTTY!"

"Yes, yes," Naoharu repeated, attempting to calm the child. "Be quiet, please. I will take you." Pippin reached up and took the elderly Japanese executive's hand, and they walked slowly towards the nearest washroom. He would be fine, Naoharu thought. This was a strong decision. After all, who could question his desire to help a child?

"There you are, Pippin!" Sarah exclaimed with relief as she ran around a corner in the washroom corridor and encountered the unlikely pair.

"This belongs to you?" Naoharu asked, his face erupting in a smile, stifling a laugh. "Of course." He looked down at the recently-relieved child, "Pippin, is it? What an interesting name. I might name a product after you…"

He gently pushed Pippin toward Sarah, shook his head, and chuckled to himself quietly as he walked away. "Pippin…"

"So Pippin saved Naoharu's life?" The now-free Jamie could scarcely believe it when Sarah told him in the back of their father's sedan. "And you didn't set it up? Wow!" Jamie looked at Pippin with genuine admiration. "I didn't know you had it in you." Pippin laughed at him, and returned to his daydreaming.

"You kids and your fantasies!" Steven, the sunshine he had basked in after concluding his deal with Commodore having promptly turned to rain upon discovering his children's antics, chastised them from the driver's seat, "Can't you knock it off for one day? 'Stopped an assassination'… what will you come up with next, I wonder? Actually, don't tell me. I don't want to know! All I do know is that you didn't get this craziness from me… your mother on the other hand…"

The Sliced Salami Society didn't bother paying any further attention to their father's ranting, instead reflecting upon their glorious victory during the long drive back to New York. They had won the day, and that was all that mattered. Naoharu Yamashina was safe. And so were they. It's not like the assassin knew who they were, did they?

Had a certain card of theirs been collected by the janitorial staff that evening from the floor of the convention centre housing the Consumer Electronics Show, that might have been true. However, it was not, for it had already been obtained by someone else, someone who had been outsmarted despite their superiority, someone who would want to have another chance to defeat the Sliced Salami Society, someday.

Someday soon.

Would you like to see your short tech-related story published in Android Dreams? E-mail your tale to editor@paleotronic.com and we'll consider it.

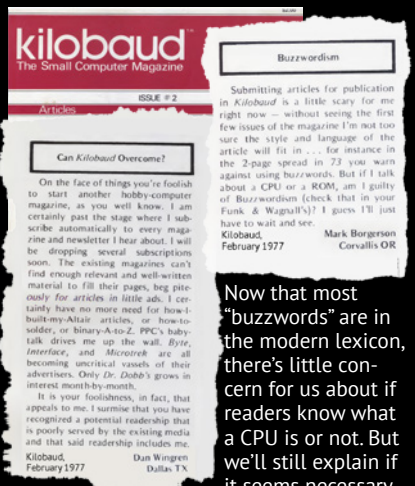
"About your first issue..."

Paleotronic is certainly not the world's first technology magazine. Here's a look back at reader responses to the first issues of a number of notable publications, including Byte, Personal Computing, BBC Micro User, Kilobaud, onComputing and C&VG.

Personal Computing's first issue was met with a variety of comments, from the gushing to the passive-aggressive... Feel free to be snarky with us. We can take it!

Readers of computer newsletter ECS were concerned when it changed into Byte overnight, but they would be happy later as Byte would become, well, Byte... Extremely influential on the computer industry, Byte would publish for over 20 years.

Supported with television programming produced by the BBC, Acorn's BBC Micro would become a popular first computer in Britain, and inevitably magazines focussed on the platform followed. BBC Micro User (later The Micro User) would publish for nearly a decade.



Now that most "buzzwords" are in the modern lexicon, there's little concern for us about if readers know what a CPU is or not. But we'll still explain if it seems necessary.

We also share the concerns about the foolishness of starting "another hobby-computer magazine" (although we're obviously much more than that!) But retro-technology magazine rack is not crowded, so hopefully we'll have a little of Kilobaud Microcomputing's six-year success...

Published by educational book company McGraw Hill, onComputing only published eight issues in 1979 and 1980.

Let's not be like onComputing.. we plan to be around for a while!.

Computer and Video Games took a more entertainment-focussed approach to the computing magazine world. Where most targeted business, education, applications and maybe some games, C&VG went all-in on fun.

Dead Letters features letters to the editor from vintage computing, gaming and electronics magazines...

FidoMail

"Nobody knows you are a dog on the Internet"
Drawing by Fritz Ahlefeldt

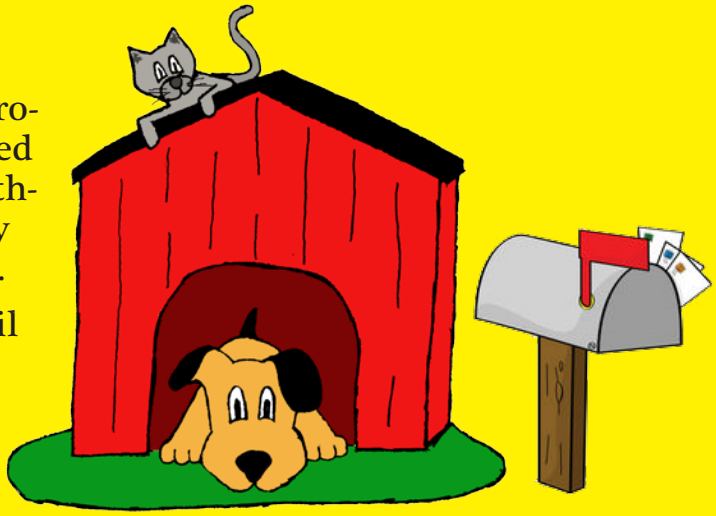
Since this is our first issue, we don't have any FidoMail! So instead, here's one from the Editor to you, the Reader...

Dear Reader...

While it has certainly been a rewarding experience researching, designing, laying out, editing and (mostly) writing this first issue of Paleotronic magazine, it is a certainty that a periodical such as this can only survive with the input and direction of readers. As such, I implore you to interact with us, for it is only through that interaction that we can determine the content that will appeal most to our subscribers, and hopefully (hopefully!) help us acquire additional ones.

Follow us on Twitter, Like us on Facebook, comment, reply and e-mail us anytime at editor@paleotronic.com. Thank you!

Yours Truly,
The Editor



FidoMail was an early networked e-mail protocol that allowed users of FidoMail-enabled bulletin board systems to message each other. Back when you didn't know if the entity you were talking to was a human or a dog.

Our "letters to the editor" section, FidoMail is more likely to contain Facebook comments and Reddit posts than actual direct letters, but if you want to send one in, you can mail them to editor@paleotronic.com

Interesting Developments

Inspired by The Archivist's look at the Disk II floppy disk system for the Apple II, our focus this month in Interesting Developments are tools that help you image and manage Apple II disk images.

We're looking at two: Passport and diskM8.

Passport

The Apple II deprotectionist known as 4am has released a tool that automatically removes a number of different copy protection schemes from original commercially-sold floppy disks. All you need is an Apple II (or II+, IIe or IIc) with two disk drives.

After downloading a copy of the Passport disk image from the link below and writing it to a real floppy using ATDPro, you simply boot the newly created Passport disk, remove it, and then insert the disk to be deprotected in your first drive and a blank floppy in your second drive.

After you press your C key, Passport will duplicate the original disk, then set to work scanning for various copy protection methods, removing them when it finds them. If all goes well, you'll end up with a deprotected copy which can itself be duplicated, or imaged to run in an emulator. Passport can find and remove 60 different copy protection schemes. So, save your aging floppy disks today. Get Passport!

Download it from github.com/a2-4am/passport/releases

diskM8

So, what if you've deprotected your collection of Apple II disks, then imaged them on to your computer, and you want to see which of them are unique and haven't already been recovered and shared by someone else? Well, there's a tool for that too!

diskM8 is a command-line program for Windows, MacOS and Linux that helps you work with Apple II disk images. You can read and write files to and from them, detokenise and retokenise BASIC files, copy files between disk images, and more!

But diskM8's neatest trick is that, after "ingesting" your disk image collection, it can compare all of them, finding not just complete duplicates, but also "active" data copies (disks copied over other disks), and disks that only have a small percentage of differing information (such as a high score file). Using diskM8, you can weed out non-unique disks, and find out if you've discovered a bit of vintage data gold.

Get it from github.com/paleotronic/diskm8/releases

paleotronic microM8

the microM8 story

A couple of years ago, we here at Paleotronic were rattling our collective brains over a conundrum: how could we get more people (particularly young people) better interested in engaging with (read: playing) vintage computer software, specifically that written for the Apple II?

Of course, you could already download one of a few emulators, get some disk images, read some documentation and figure out how to get them working – but that process wasn't very user friendly, and we decided we wanted to streamline it somewhat.

And so, we built an Apple II emulator (for Windows, MacOS and Linux, to make sure no one was left out) that had a built-in on-line library of both BASIC programs and disk images, which cut a few steps out of the process of discovering (and learning from) classic Apple II software. You can just browse the library, choose a disk and play. Simple.

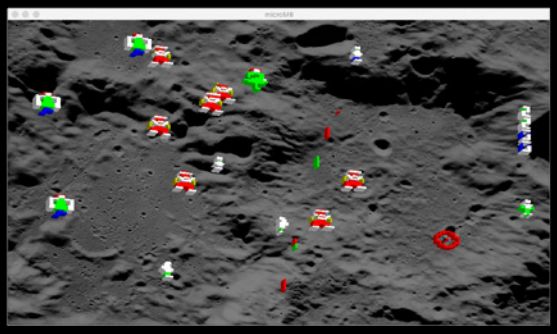
We also built our own BASIC and (3D!) LOGO interpreters, so that you didn't have to go through the hassle of booting a disk image to explore these vintage programming languages, and took the opportunity to refine their user interfaces a bit, introducing features such as command-line history, better command-line editing, and full-screen editors to aid in writing code.

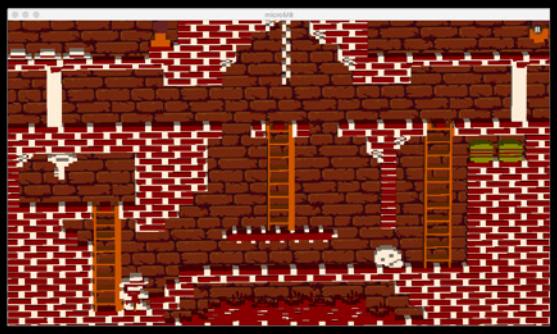
While we were at it, we introduced text colours (something the real Apple II lacks), an 80x48 text mode, graphics characters (like the Commodore's PETSCII), sound commands and other niceties to make Applesoft BASIC more featureful. Users could "upcycle" BASIC programs with these new functions, if they were so inclined. (We're still working on adding all the commands we want, but soon you'll be able to engage in all sorts of magic, so stay tuned!)

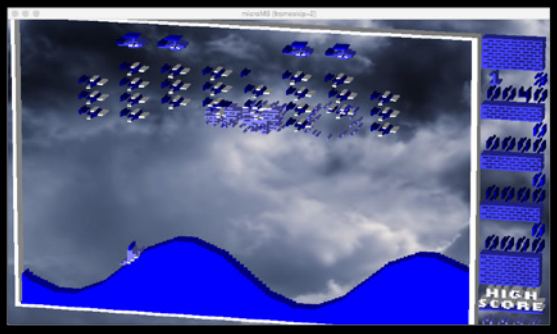
But we still had a fairly serious problem: younger users still found Apple II games to be boring! Which, to be fair, by modern standards they sort-of are. They're flat, most of them are pretty static and don't move around much, they don't sound very good, and the Apple II's limited colour palette doesn't help, either. So, what could we do?

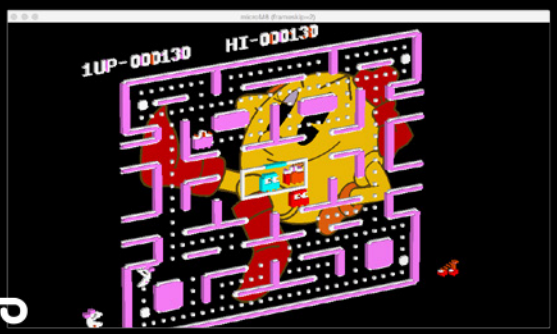
Well, an emulator doesn't necessarily need to emulate everything. I mean, if you want an authentic(ish) experience, microM8 (and several other emulators) can provide that. But what if you don't? What if you want to be better engaged? Well, there's nothing to stop an emulator from remapping colours – check. What if we rendered the pixels as cubes, and let the user move the camera around? Check. What if we let them place images behind the Apple II's graphics to liven things up a bit? Check. What if you could shift cubes forward or back based on colour, to enhance the 3D effect? Check! Background music? Memory-trapped sound effects? Check and check.

What if users could write BASIC "control" programs to manipulate vintage games while they were playing? Check. And finally, how do we put all of this together? We created a new file type, a microPAK, which bundles together all of the configuration files, original software, control programs, background images, sound files and whatever else. Some examples of microPAKs are shown to the right. Check them out by dowloading microM8 from microM8.com









Confessions of a Disk Cracker: the secrets of 4am.

Continued from page 32.

approximation of a disk, just the post-processed nibbles and bytes. This was sufficient for digitizing cracked software, because the crackers had already normalized the original disks down to bytes so they could distribute them via BBS.

In the modern era, there is some specialized hardware that can digitize a floppy disk at the level of magnetic flux changes. For a variety of reasons, the hardware developers focused on non-Apple II platforms, and a few unresolved technical differences prevented a community of Apple II-specific preservationists from reusing it. There is some new development on this front, and I'm optimistic that collectors will soon be able to create flux-level digital copies of Apple II floppy disks, and users will be able to boot original software in emulators.

What copy protection schemes are the most common, and which one is the most tricky, in your experience?

The most common protection schemes were the ones that were productized and resold to hundreds of publishers. This was coordinated through the disk duplication houses, who offered copy protection as a "value add" on top of mastering the disks themselves. Publishers got the benefit of the latest and greatest copy protection without needing to play the cat-and-mouse game themselves.

The E7 bitstream, a.k.a. "generic bit slip protection," was the most common. It was a sequence of 1s and 0s, specially crafted so the first half could be read "in phase," then the code would intentionally skip half a byte and read the second half "out of phase." Bit copiers would drop bits due to hardware limitations, and the out-of-phase values would be wrong. It was brilliant.

E7 was invented in 1983 and immediately productized. It protected "Moptown Parade" in 1984, "Rocky's Boots" in 1985, and "Prince of Persia" in 1989. I've found it on disks from Addison-Wesley, Advanced Ideas, DesignWare, Edu-Ware, Microcomputer Workshops, Mindscape, Scholastic, Scott Foresman and Company, The Learning Company, Unicorn Software, Broderbund, Data East, Epyx, and Windham Classics.

The trickiest protections are the ones that are deeply integrated with the program itself, instead of being bolted on by a separate company. Some publishers chose to invest in copy protection themselves, to hire that expertise and keep it in-house. So you get "Gumball" by Broderbund Software, where the author of the game worked directly with the author of the copy protection. If you think you've removed all the copy protection because you got the game to boot, you're in for a surprise on level 3 when the game starts misbehaving on purpose.

Which software developers or manufacturers disks (or individual pieces of software) have been the most difficult to de-protect?

Delayed protections in games were the worst. Sierra On-Line was famous for this. If you bypass the call to the self-decrypting protection check in "Threshold," it lets you play the game but you can only move your ship to the right. If you change the protection check itself so it always succeeds, "Threshold" lets you play level 1 but glitches out on level 2. There was a separate anti-tamper check that only ran after level 1!

Scott Adams' "Strange Odyssey" doesn't run its protection check until you've started the game, climbed down the stairs, and taken the shovel. "The Count" doesn't check until you've climbed into the dumbwaiter, which is about 15 moves into the game. And those are the easy ones, because they just reboot or crash immediately if they fail. "Transylvania" has a delayed protection check that deletes a vital location from the map and renders the game unwinnable. "Prince of Persia" neutralizes the effect of a potion you need to drink to finish level 7. "Conflict in Vietnam" has both on- and off-disk protection and 13 separate anti-tamper checks that can trigger a fatal error up to an hour later!

"Have I removed all the copy protection" is functionally equivalent to the Halting Problem. The day we can prove that we've removed all the protection from all the disks is the day the universe ends.

Although you obviously prefer creating "clean cracks" of software, is there a place for "cracked" disks that have been altered? Do they have their own historical significance?

Everything has historical significance. The choices those pirates made were driven by constraints that are largely absent today. Nobody born in this millenium has had a download fail at 99% because someone picked up the phone downstairs. Nobody cares about the difference between a 1K download and a 1.1K download. I've never needed to advertise the phone number of my BBS. I can read and search every issue of Hardcore Computist on the supercomputer I carry around in my pocket. Classic pirates did more with less.

You de-protect a great deal of educational software. Is this just for completeness and / or because historical "crackers" largely ignored the genre, or do you feel this software is potentially still useful in the education area?

I'm under no illusions that anyone will actually use this software for its original purpose. At best, it would be a technology demonstration, "look how far

we've come, but 1 + 1 is still 2," that kind of thing. But its original purpose was important! These were not just bits on a disk or disks in a box. This was curriculum. This was how we taught math and science and grammar and history to an entire generation of children. That seems like something worth saving.

You wrote a utility called Passport to help de-protect Apple II software, so that others could convert their own disk collections into functional emulator files. Could you explain a bit about that utility, and how it works?

There were a number of cracking utilities back in the day. The most versatile was called "Advanced Demuffin." It used a protected disk as a weapon against itself, reading every sector of the disk with the disk's own code ("RWTS"), then writing out the data to an unprotected copy. Two problems: first, you had to capture or extract the RWTS yourself; Advanced Demuffin wouldn't help you with that. Second, you had to patch the code on the unprotected copy so it could read itself.

The vast majority of my early cracks followed the same 3-step process: capture the RWTS, run Advanced Demuffin, patch up the copy. After 8 cracks, I wrote a tool to automate step 1, capturing the RWTS. After 152 cracks, I wrote a tool to automate step 3, patching up the unprotected copy.

After 688 cracks, I wrote Passport.

Passport is an automated disk verification and copy program. And when I say "automatic," I mean it. Unlike classic bit copiers, there are no parameters, no options, nothing to set beyond destination slot and drive. It either works or it doesn't.

Also unlike classic copiers, the copy it produces is fully unprotected. It handles all 3 steps of that 3-step process. No fiddling with boot tracing on the front end, no fiddling with sector editors on the back end. It's all built-in. Passport is a distillation of everything I've learned about cracking: every disk, every variation, every edge case.

Of my first 688 cracks, 478 could have been automated with Passport.

This has completely changed my hobby. Passport ensures consistency. I don't worry about missing a patch or mistyping a hex value. I don't spend any time doing the grunt work that computers can do for me. If I find two disks with the same protection, I write a new Passport module to automate it. Remember, protection was productized. If I've found 2, there are 20 more. They're out there, rotting away on physical media.

Automation frees me to look beyond the bits. I can spend more time on in-depth write-ups of protection schemes that can't be automated. I can take screenshots and make boot videos to show off all this wonderful educational software. The copy protection is the least interesting part of these disks. It's just the part that prevented us from studying all the other parts.

4:00am

As of February 2018, 4am has deprotected 1673 Apple II software titles, and that number is still climbing.

The 4am collection is online at https://archive.org/details/apple_ii_library_4am

Most of the software titles listed there can be accessed using the Internet Archive's in-browser Apple II emulator.

Passport is available from https://archive.org/details/Passport4am

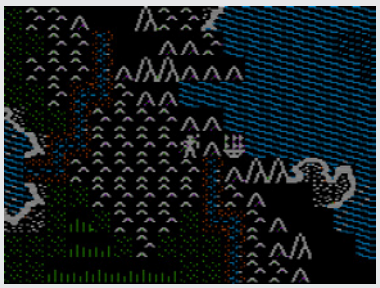
Yesterday's News

LATEST FROM THE RETRO NEWSWIRE

A collaboration between a number of individuals in the Apple II community including Mark Lemmert, Mike Reimer, Peter Ferrie and Chris Torrence, the "collector's edition" version of Nox Archaist will ship in 1980s-style RPG packaging, including a full-colour cardboard box, a canvas world-map, a printed game manual and four double-sided floppy disks. It will also include reproductions of game elements such as a writ from the King, hand-sealed with royal insignia in wax, a segment of chain-mail armour and a few coins. Whew!

Of course, those with less money to shell out can just buy the floppy disks in an old-school zip-lock bag, or get the disk images via digital download – but we at Paleotronic think everyone is better off digging deep and getting the full 1980s RPG-gaming experience. After all, when will there be another chance quite like this?

Apple II game developers 6502 Workshop have announced that there will be another Kickstarter campaign for their 8-bit tile-based RPG Nox Archaist.



The brand-new Ultima-inspired game will reportedly have players battling Death Knights, Demon Lords and "our own blood chilling supernatural creations". It will also offer a complex storyline and a comprehensive combat system.

Unfortunately, 6502 Workshop's first Kickstarter attempt in late September didn't meet with success, despite garnering the support of Richard Garriott, Ultima's "Lord British". As Nox Archaist co-founder Mark Lemmert noted on the project's blog: "Turns out the number of people who are as excited as us about playing a brand new Ultima-inspired game on an Apple II / Mac / PC aren't quiiiiite as plentiful as we initially expected. Hah! They don't know what they're missing."

But happily, they (and players) will get a second chance to make the magic happen in 2018. Check out the project, and sign up for Kickstarter updates at 6502workshop. com

THE NINTENDO CLASSIC MINI RETURNS

Good news everybody! After selling over four million Super Nintendo Classic Mini's, its maker has announced that the Nintendo Classic Mini will be making a return later this year, and not in limited numbers this time. So if you weren't able to snatch one up the last time around, you're going to get another opportunity.

Releasing his company's earnings report, the Nintendo president Tatsumi Kimishima explained, "We view them (the minis) as an opportunity to garner interest in Nintendo Switch from those who have not interacted with video games in a long time, or ever."

So what if they're a marketing tool, they're awesome! They'd be better if they had an SDCard slot though... but we're not holding our breath on that one. Nintendo is also planning to make a number of classic games available through its Switch Online service later this year. It will reportedly provide unlimited gameplay for a US$20 annual fee.

Nintendo has also announced that, 25 years after the debut of its failed live-action Super Mario Bros. movie (see Pop Culture), it's taking another kick at the cinematic can, partnering with Illumination Entertainment (makers of the "Despicable Me" series) to produce an animated feature starring the two plumbers – however, don't get too excited, it will likely be several years before the new movie gets released.

Nintendo consoles aren't alone in getting the "mini" treatment... hold tight retrocomputing fans: the Commodore 64 is about to get its own shrunken reproduction!

The 50% scale replica titled "The C64 Mini" has 720P HDMI output and a classic-style joystick, and will come with 64 built-in games such as Boulder Dash, Impossible Mission and the Temple of Apshai Trilogy.

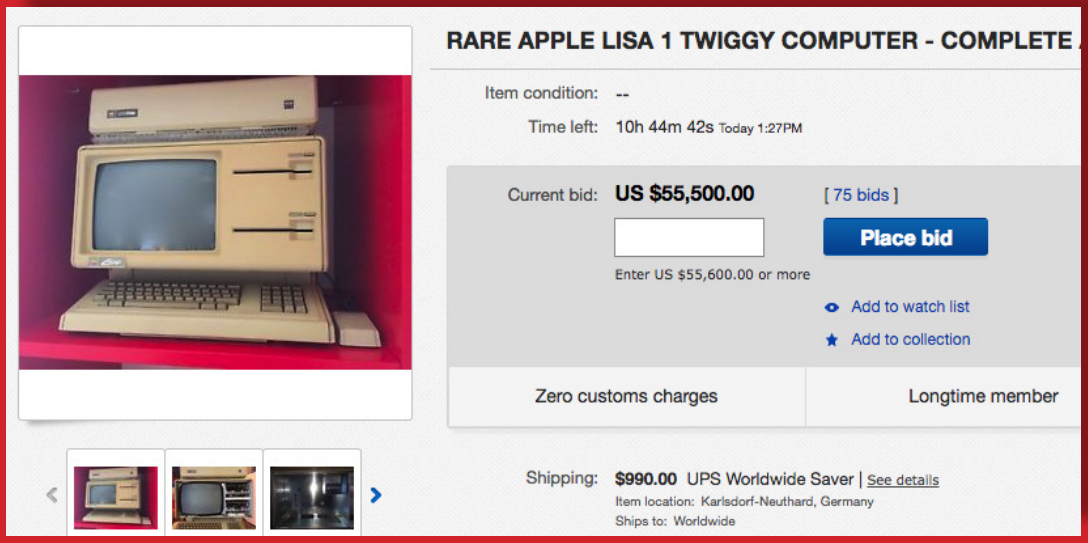
The C64 Mini features a save game function, and it also has two USB ports to allow for an external keyboard (the Mini's keyboard is non-functional) or a second joystick. The website states that updates can be installed using a USB memory stick, but does not say if users will be able to boot games from it.

It is scheduled to be on sale from the 29th of March via Retro Games' website at theC64.com for around US$70. Retro Games says it plans to release a full-sized C64 replica later this year.

THE C64 MINI

EBAY GOES CRAY

This eBay listing for an Apple Lisa 1 provides an extreme demonstration of the ever-increasing value of vintage computers.



Selling in 1983 for US$10,000, the Lisa was one of the first personal computer systems with a graphical user interface to be commercially available. It came with 1 megabyte (MB) of RAM and a 5MB hard disk, and had a Motorola 68000 CPU (the same one used in the later Apple Macintosh, Atari ST and Commodore Amiga personal computers.)

Named after Steve Jobs' daughter, the Lisa's high price (almost US$25,000 2018 dollars) hampered its sales, hurt further by the poor reputation of its "Twiggy" high-capacity 5.25 inch (13.3 cm) floppy drives. These would be replaced with more modern 3.5 inch drives in the Lisa 2.

This particular Lisa 1, however, seems to have defied the current pricing of most retrocomputers, which often sell for far less than even their original sticker price, never mind adjusted for inflation. At US$55,500 this auction is already at more than double the adjusted-for-inflation price of the Lisa 1.

This could be in part because Lisa 1s made up a small proportion of the estimated 100,000 Lisas sold.

ATTACK OF THE CLONES

The limited release of the Nintendo Classic Mini in 2016 revived the market for "retro-clone" consoles as people flocked to re-live the video games of their youth. Paleotronic acquired a couple of common clones from eBay in a quest to answer the question, "Are they any good?" Read on to find out...

FC-COMPACT

Clones!

While most clone systems seem to go for minimal aesthetic similarity, the FC Compact conjures up memories of the original Famicom. Well, not so much memories, as I didn't grow up with one. Being in Australia we had access to the PAL version of the Nintendo Entertainment System.

There are a few differences though. Where the Famicom had hardwired controllers, the FC Compact uses two standard (Atari style) 9-pin connectors for the controllers which might be a Godsend if one of them stopped working. Aside from that, it still has the cute slots on the side to dock the controllers when not in use, and the same off-white, gold and red trim that folks would remember. It also lacks RF-Out in favour of composite video out (but I'm not that sure anyone would miss tuning in their TVs that much).

So, how does it fare?

Well, I plugged it into an old CRT television for the most part which works quite well. The picture is excellent and the colours are vibrant in all their NES / Famicom glory. Initially I had to fiddle with the set as the signal was NTSC, and there is a distinct looseness on the video out connector. A few times the picture displayed in black and white and I had to 'jiggle' the plug to get color.

The unit plays most games well. It's based on NOAC (NES On A Chip) so it has a problem with a few titles but 99 percent of titles will work fine. Sound is generally good in most cases. The biggest area of confusion is the button layout for the "A" and "B" buttons, which comes about because there are two of each arranged in a diamond configuration! The D-Pad, select and start are all placed as expected though. Maybe they expect button failures and it's always handy to have a spare, right? Generally the buttons feel as I would expect them to feel on an original unit.

The unit comes with some erm 'built-in' titles of dubious origin; 500 in fact, however the real benefit is being able to play the real 60 pin Famicom cartridges. It's important to note this as your old 72-pin NES carts will not work. You have been warned. Cartridges with battery backed up save also work fine in the unit, which is a plus.

Overall the picture quality and audio are excellent, and when plugged into our old CRT television, it reminded me of my childhood in the 1980s. Considering the low price ($70) it's definitely worth a look if you are having an issue sourcing the real system.

PROS

- Looks a lot like the real thing.
- Decent emulation, video and sound courtesy of NOAC.
- Good quality controllers.
- Plays real cartridges.

CONS

- Flaky video connector (might have been just our unit)
- Potentially confusing A/B button layout.

OVERALL: 7/10

SEGA MEGADRIVE CLASSIC

I have fond memories of getting an original generation Megadrive at a second hand store and being able to play so many cool games with it when I was at University. It holds a special place in my heart for that reason. Later on I had a Megadrive II which while it was OK, never quite held the same allure as the original.

One option for reliving those days is the At Games has a Sega Megadrive Classic console, which comes with 81 built in games.

Cosmetically, this is a stock standard At Games clone which means besides Sega Megadrive branding it doesn't look much like the original. It takes two controllers using the same connectors as the original system, but the controllers are a bit smaller than the stock Megadrive controllers. It has power and stereo AV connectors on the back, and the unit has a cartridge slot on the top which takes original cartridges.

This unit is officially licensed and as such contains 81 built in titles. It has a lot of classics like Sonic I and II, Mortal Kombat I, II, III, the Golden Axe games but don't expect to get 81 originally released games. By my count, approximately 39 of the titles on here aren't original Sega games, but seem to be public domain or other non-Megadrive games.

So, how does it stack up? Like a lot of Sega emulation nowadays this is based on the Firecore emulator. For most part the gameplay is good, although the video out (composite) looked terrible on a flat panel TV and showed rolling interference. Paradoxically it looks very good upon plugging it into a CRT television.

Sadly, I wish the same could be said of the audio, but unfortunately it seems slightly distorted and some music seems off key and reminded me quickly that it was just an emulation. I should remark that I was never a fan of the Genesis II audio either as they went from a dedicated Yamaha chip to a system on a chip. Perhaps this is something that can be improved in future versions.

As to the cartridge slot, it seems to work fine, although was a little tight at first. Looney tunes and Sunset Riders (two games that we had to hand), worked fine in there. Overall it does what it sets out to do, but lacks a little polish in the audio.

PROS

- A good selection of classic titles
- CRT video quality was excellent
- Controllers ok, can be replaced with originals

CONS

- Filler games make up the 81
- Audio emulation could stand to improve
- Video looks washed out and has interference on a flat panel.

OVERALL: 5/10

The ART Scene

Continued from page 24

So here are some vital statistics about the features and limitations of the PETSCII visual art medium, and how it may be at variance from Other Textmode Art Formats You Have Experienced:

- One screen is all you get. No epic ANSI art "scrollers" or "screeners" winding down the display like a tapestry. (Of course, if you are sufficiently clever, you can of course use PETSCII characters in a program of your own devising with beefier scrolling capabilities.)
- The overall canvas, at 40x25 characters, has a lower textmode resolution than the 80x25 you might have come to expect from MS-DOS, and while it shares a palette of 16 possible foreground colours, you have to choose a single colour for the background of the entire screen. (ANSI art, by contrast, offers 8 background colours by default on a character by character basis, plus 8 flashing ones.)
- Speaking of colours, PETSCII does experience the bane of the 8-bit display: colour clash if too many different foreground colours are used too near to each other, which needs to be carefully managed, tiptoed around or brazenly ignored.
- While PETSCII does offer two character sets – shifted and unshifted – artists must choose to use to sample exclusively from one or the other in their compositions, and never have the complete range of PETSCII character-combination possibilities at their disposal.

Belgian textmode artist Otium of Galza straddles both worlds, equally fluent in ASCII and PETSCII, and notes that while there is a burden of additional constraints imposed while drawing textmode art on the C64, handcrafted textmode art is already a delicate exercise in elegantly working around constraints... so drawing in PETSCII can be understood to be in a sense a purer, more condensed version of the ANSI drawing experience, where further minimalism yields greater virtuosity!

Marq of Fit happily coincided with wider demoscene casual interest in the medium in 2013 resulting from the CSDb forum's plain PETSCII graphics compo, releasing in that year his C64-native PETSCII editor (confusingly also named "PETSCII"); there are a number of other editing tools for that machine offering various feature sets, each with their own pros and cons (most notably varying output formats, each optimised for specific use cases)...

...if you are both interested in PETSCII and a devotee of vintage hardware, you probably already have strong opinions about which flavour is best suited for your particular needs.

PETSCII has a compelling and distinct look, as can be testified to by the imitation of PETSCII limitations in C64 hirez graphics for purely aesthetic reasons, but for fans uninterested in committing to the constraints of emulation or vintage hardware use, operators of contemporary computers can take the PETSCII character set far with vectorpoem's PLAYSCII drawing program and Grid Sage Games' REXPaint, regularly driven to its limits by UK textmode artist Polyducks – but beware that what these programs output merely looks like PETSCII, and will not be intelligible back on the mothership!

In addition to the PETSCII artists mentioned above, there are a number of further renowned and award-winning artists working in this medium. From within the demoscene, the curators of the Masters of Pixel Art books endorse the virtuous Scandinavians ilesj of Finland, Mermaid of Norway, and Redcrab and AcidT* of Sweden, plus the masterful Balkan strains of iLKke of Serbia and rexbeng of Greece.

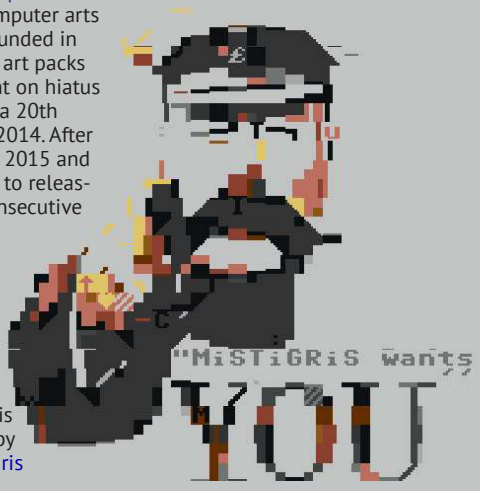
But lest you mistake it for a purely European phenomenon, you can also find PETSCII art practiced in very different ways from out of the demoscene's shadow by PetsciiCola in Argentina and Ailadi in Shanghai, making for a truly global medium.

PETSCII by Polyducks

Contributor Rowan Lipkovits heads Vancouver computer arts group MiSTiGRis. Founded in 1994, MiST released art packs until 1998, then went on hiatus until returning with a 20th anniversary pack in 2014. After anniversary packs in 2015 and 2016, MiST returned to releasing monthly – 15 consecutive packs and counting.

You can browse Mistgris packs and download them from mistigris.org

If you would like to contribute to a pack, join the Mistgris group on Facebook by searching for "Mistigris Computer Arts".



PIXEL PLAYAS

continued from page 71

A victim of the the console's success was poor R.O.B. It was thanks to him that Nintendo were able to market their console in the US, though only two below average games were made that utilised him, and there were no plans for any more. Though the 'Deluxe Set' that carried R.O.B. was still made available for a while longer, Nintendo wanted to shift their focus to the Entertainment System itself. Miyamoto's Super Mario Bros had been released in Japan just prior to the launch of the NES, and though Yamauchi was far from impressed at the time the game took to develop, he was thrilled with the sales that were generated upon its release. Though the NES was selling pretty well in the US, he felt that bundling Super Mario Bros with the system could give it that final push it needed to make Nintendo a household name.

Nintendo of America were ordered to create new bundles containing two controllers, a light gun, and a cartridge containing Super Mario Bros, and Duck Hunt. Retailing at $130, this bundle went on to sell over 40 million units, and is a big part of Nintendo's success in the US. Though the Super Mario sequels were also bundled with the NES, their sales pale in comparison to this original set.

Nintendo's worldwide expansion saw the Nintendo Entertainment System hitting European and Australian shores. Initially interest in these countries wasn't as high as America, as the video game crash hadn't happened there, and it wasn't until the age of the Internet that many gamers would even be aware that there was a crash. While the Atari 2600 was successful in these regions, gamers tended to gravitate towards computers. In the schoolyard children split their allegiances between Commodore, Sinclair, Amstrad and Apple, with many parents buying the same brand of computers that the schools had.

In 1986 the Sega Master System was released in the US, but in a country dominated by Nintendo the console didn't reach a wide audience. The slow start Nintendo received in Europe and Australia gave Sega a better chance at success, and in several countries it outsold the NES by a considerable amount. Nintendo now had an arch nemesis, though their strict third party agreements saw many companies unable to legally create games for the Master System. On the flip side, Sega was very successful in the world of arcade games and many of these games were ported on to the Master System, but not the NES.

This birth of these console wars saw a major casualty in the form of Atari. The former video game giant struggled to keep up with Nintendo and Sega, and its 5200 and 7800 systems barely made a blip in the gaming community. The release of the Lynx in 1989 was critically acclaimed, though sales were small compared to its rival, the Nintendo Gameboy. The release of the Sega Gamegear shortly after killed the system off completely. After one final attempt at a console, the unsuccessful Jaguar, Atari owner Jack Tramiel decided to leave the industry.

Without a toy to hide behind, Nintendo was now marketing the NES as a video game system. There was nothing to hide. They had successfully manoeuvred their product onto shelves in the guise of a robot toy with accessories, now the accessories stood on their own two feet. Nintendo could do no wrong, and the release of the Gameboy in 1989 cemented this in the minds of gamers. The problem with success is that it's finite, and Nintendo learned this in 1989, when Sega's 16-bit Megadrive, branded as the Genesis, landed on American shores.

With technology advancing Nintendo had no choice but to release its own 16-bit console. Graphics were king, and the Megadrive could provide visuals that the NES was simply unable to. However, Nintendo had an advantage through their agreements with third party agreements developers. Though these agreements were modified as Nintendo started to lose marketshare, it still put them in a position of power. They also had plenty of goodwill from gamers who had grown up on the NES. The Nintendo name was one that gamers trusted.

The Super Famicom was released in 1990, with the Super Nintendo Entertainment System being released in 1991. Though there was a new console on the market, the original NES was still available, though it was remodelled for the 90s. Gone was the square front loading box and in its place was a rounded top loading console. The controllers were remoulded with two round ends, and an adjoining section in the middle. Affectionately known as the 'dog bone controllers', these new joypads are more ergonomically designed. The Famicom was also redesigned in a similar manner, though the top of the console is flatter than the NES. This redesigned Nintendo Entertainment System remained on the market until 1995 in the US, though both there Famicom and Super Famicom were discontinued in 2003 in Japan.

The Nintendo Entertainment System is arguably the most fondly remembered video game system of all time, inspiring many knock offs and imitators known as 'Famiclones'. Nintendo have always recognised and understood the legacy of this system, re-releasing many of their NES titles on newer systems. This legacy continues to this day with the release of the Nintendo Entertainment System Classic Mini in 2016, and new plans for a Netflix style NES service for the Nintendo Switch.

BACK IN THE DAY

In February and March 1984, the introduction of the Apple Macintosh the previous month dominated magazine coverage.

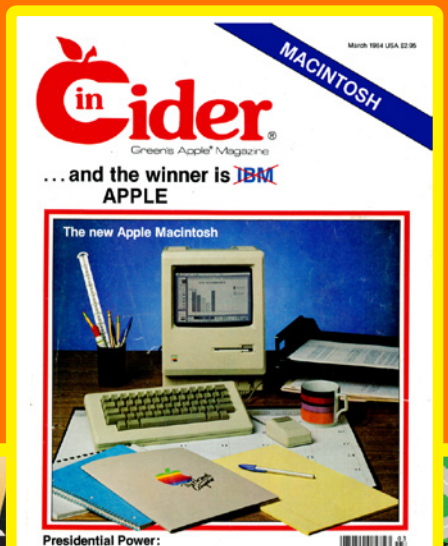
The brainchild of Apple's Steve Jobs, the Macintosh was the culmination of five years of engineering, and a merging of Apple's low-cost Macintosh "computer appliance" project, started by Apple engineer Jef Raskin, with Jobs' Xerox Alto-inspired high-end Apple Lisa, both originating in 1979.

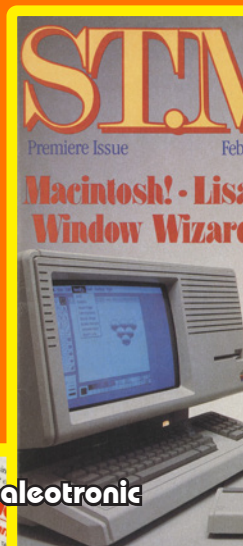
As time progressed and the cost of components used in the respective machines decreased, the Macintosh was soon capable of executing Lisa software, and after Jobs was forced out of the Lisa project for micromanaging it, he took the reins of the Macintosh team, realising that the Macintosh was likely to be more marketable than the US$10,000 Lisa.

The final goal of the Macintosh project became to create a completely GUI (graphical user interface)-driven computer that would be simple to understand and use, but at a reasonable enough price to make it commercially practical. The final design had an integrated 512x384 pixel monochrome display and 128KB of RAM – just enough to run the Macintosh's operating system, split into two components called System and Finder, and two applications, MacWrite, a word processor, and MacPaint, a graphics program.

The general public's first introduction to the Macintosh occurred during 1984's Super Bowl, when Apple's infamous "1984" commercial aired. Directed by Ridley Scott, the commercial stylises the Macintosh as a rebel in a world ruled by the dominating IBM PC. The commercial was a hit, and the US$1,995 Macintosh was made available for sale two days later.

Byte Magazine's reviewer wrote that "(t)here is a lot to like about the Macintosh; it is a superb example of what American technology can do when given the chance," calling its features "all important innovations done well." However, they felt using the Mac with only its internal disk drive was impractical, and that a second drive was a necessity. They also felt the Mac, once a



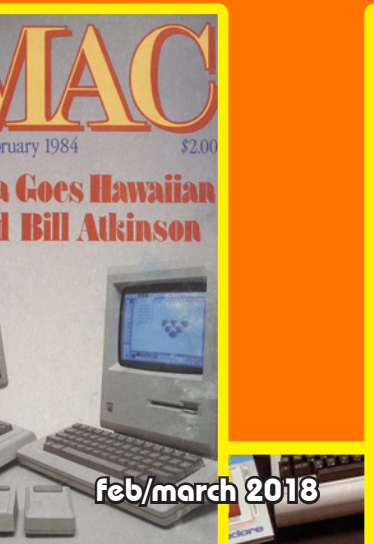


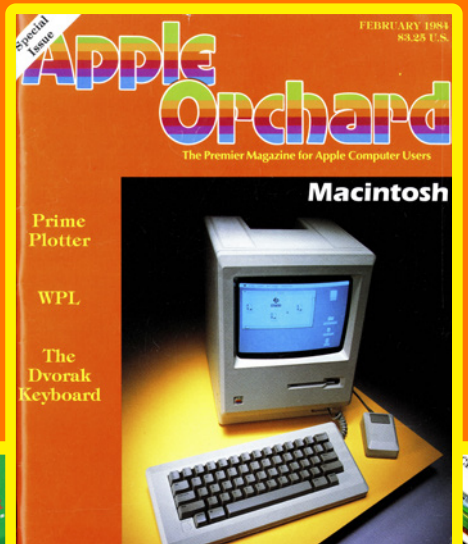
second drive, printer and software was added, was too expensive. (Byte also published a few Mac rumours, including that MacWrite was initially called "Macauthor" and MacPaint "Mackelangelo". Punny people!)

InCider wondered, "For the past year or so, people close to the personal computer industry have speculated that there may not be a place for any industry standard other than MS-DOS. Now, after Macintosh, they may well wonder if there is a place for MS-DOS," and called the Macintosh "the best hardware value in the history...of the personal computer." The Australian Apple Review's Gareth Powell concluded that "(i)f you try not to think of it as a microcomputer, and try, instead, to see it as a standard piece of equipment to be used in an office then you will start to appreciate the beauty of the concept." He finishes, "When I first reviewed the Macintosh I was dubious. Now, on the road to Ryde, I have seen the light and I am converted.

Personal Computing's Charles Rubin called MacPaint "the most incredible combination of simplicity and power I've seen in a graphics program," and the magazine's associate editor, Kevin Strehlo wrote that Macintosh team-member, Andy Hertzfeld, "believes Bill Atkinson's MacPaint will convince people that they don't have to choose between work and playing a game – that work can be fun." However, Hertzfeld was concerned that Apple may not be able to sell enough Macs "to really change the world".

Apple Orchard's Scott Knaster declared, "There's one more very nice compliment we can pay to the Macintosh: it's not an IBM-PC clone," and speculated that "(the) Macintosh will open up personal computing to lots of people who never touched a computer before." Finally, new Macintosh-centric magazines MacWorld and ST.Mac loved the new computer, but they would, of course. You don't usually build a business around a cash cow and then slaughter it in public.





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& Sean McNamara

Community Calendar is the place to find out about exciting upcoming events, conferences, conventions and more, and get updates, reviews and anecdotes about recent activities in the retro-technology community.

APPLE II FOREVER

kansasfest

July 17th-22nd, 2018 Kansas City, Missouri

The granddaddy of retrocomputing conventions, the Apple II-centric KansasFest actually started while that computer was still available for sale!

The first conference, held in the summer of 1989, brought together Apple II developers frustrated with Apple's increasing focus on the Macintosh – not necessarily a remarkable occurrence for the time, but what *was* different was that the event's organiser, newsletter publisher Resource Central, housed the participants on-site at a Catholic college in nearby Kansas City, Missouri.

They found that the dorm-style accommodations encouraged interaction among attendees in a way that wouldn't had they put their guests up in a hotel. Nearly everyone who attended found the experience positive, and the event returned the following summer, and then the next.

It was at this third event the attendees nicknamed it "KansasFest", a portmanteau of Kansas and AppleFest, a series of Apple II festivals held around the US in the early 1980s. The events continued to be run by Resource Central annually until 1995, when, due to declining interest in the Apple II, the business was forced to close.

However, previous attendees weren't willing to let the event go that easily, and they formed a committee to organise the event themselves, facilitating a two-day meeting in 1995, and continuing to hold KansasFest annually.

By its tenth anniversary, the event's focus had evolved to move away from promoting contemporary practical use of the Apple II, and toward preserving the legacy of the platform, including not just hardware and software but arcane knowledge and the anecdotal experiences of its users. Sessions not explicity devoted to Apple II topics began to appear at the events, which now began to include nostalgic childhood users of the computer, and those into retrocomputing in general.

Keynote speakers began to feature at KansasFest starting in 2003 with Apple II architect and co-founder of Apple Steve Wozniak, and many influential figures in the Apple II community have appeared since.

The event has gained in popularity in recent years, and last year the organising committee had to set a limit of 100 attendees, which was sold out quickly – and so you had better get your ticket early! Keep an eye on kansasfest.org for updates about when they'll go on sale, and Paleotronic will see you there!

wozfest

Wollstonecraft, NSW 28 April 2018

The Apple II also has a devoted following here "down under", with two notable recurring events, WOzFest and Oz KFest.

WOzFest is a one-day get-together held every few months in the inner suburban-Sydney suburb of Wollstonecraft (hence the W-Oz in the name, which signifies the location of the event, and is only coincidentally the nickname of the Apple II's famous designer, Steve "Woz"niak.)

Attendees gather to work on their own (and others) vintage Apple II equipment; buy, sell, trade and often give away hardware and software; and show-and-tell new Apple II-related products. There are also frequently Skype sessions with interstate and international people of interest to the Apple II community.

There's cider (apple cider, of course) and those who stay late chip in for pizza. Most attendees are from the Sydney area but some travel from other (relatively) nearby Australian cities such as Melbourne and Canberra. There's also the occasional guest from overseas!

For more information on the next WOzFest, check out the.europlus.zone/wozfest/

oz kfest

Next city TBD

Australian attendees to KansasFest eventually felt a need to hold a similar event closer to home, and Oz KFest (a common abbreviation for KansasFest) was born in 2009, when a number of Apple II enthusiasts gathered in Wollongong NSW for an event coinciding with that year's KansasFest.

In 2013, another gathering was held in Brisbane, and in 2015 in Melbourne, but a true KansasFest-style event didn't happen until 2017, when a retreat on Bribie Island, north of Brisbane was secured for the period from the 31st of August to the 3rd of September.

The retreat featured cabin-based accommodation, and attendees were provided with all meals. Those from southern states were happy to be away from the winter cold, and much retrocomputing merriment was had by all.

Several sessions were held by participants on a number of fascinating subjects including not just those related to the Apple II, but also other vintage computers such as the Tandy Color Computer. However, the Apple II was the star of the show, when American collector Tony Diaz showed off various historical artifacts he had brought over from the United States, including the motherboard of a prototype Apple IIGS successor, known as the "Mark Twain", which never made it into production.

It is currently unknown when the next Oz KFest is going to be held, but we at Paleotronic hope it will be soon. It was fun!

Shiny, happy Apple II (and other retrocomputing) people having a great time!

reddit

r/MAME focuses on arcade game emulation, and contruction of MAME-based arcade cabinets.

r/CRTGaming discusses the repair and restoration of vintage televisions and computer monitors.

r/BBS lists new bulletin-board systems, and helps visitors with starting their own.

Reddit has a variety of "subreddits" on retrogaming and retrocomputing topics. Here's a small selection of some of the more popular or notable ones:

r/PixelArt features posts by "pixel artists" who create 8-bit-styled still and animated artwork.

r/RetroGaming contains a wide variety of vintage console gaming discussion.

r/RetroBattleStations does similar for vintage computing.

r/chiptunes showcases new 8-bit-style music.

usenet

comp.sys.apple2 is an extremely high-traffic usenet list about all things Apple II! If you're interested in getting into 8-bit computing, this is a good place to start, if only to get a taste of the depth of the subject matter, and the enthusiasm many people have for it...

Companion groups comp.sys.apple2.programmer and comp.emulators.apple2 talk about Apple II programming and emulation respectively.

UseNet is a good source for retrocomputing discussion and information. You can access UseNet groups through groups.google.com and subscribe to have new posts sent to your inbox!

Other retro-related UseNet groups:

comp.sys.cbm	Commodore discussion
comp.sys.sinclair	Sinclair discussion
comp.sys.tandy	Tandy (Radio Shack) discussion
comp.sys.TI	Texas Instruments discussion
comp.sys.acorn.*	Several sub-groups about the Acorn computer family
comp.sys.amiga.*	Several sub-groups about the Commodore Amiga family.

@ mailing lists

Retro Roundup sends out daily digests of updates from a number of retro-related blogs. Subjects include vintage home computers, video-game consoles, news and upcoming events.

You can subscribe at retroroundup.com

ClassicCmp maintains two well-traveled mailing lists dedicated to "classic" computing, which they define as topics related to any computer or software more than ten years old. There's a casual discussion list that allows for off-topic chatter, and a strict on-topic list for those who don't want unrelated banter.

You can subscribe to either list at classiccmp.org

Not a mailing list but worth a mention is Stack Exchange's Retrocomputing section, which has various Q and As that make for interesting reading: retrocomputing.stackexchange.com

chat rooms

Chat about all things Apple II on A2Central's IRC server. Point your IRC client at irc.a2central.com and join #a2c.chat

You can chat with fellow retro-peeps using Internet Relay Chat (IRC is itself retro, originating in the late 1980s). You can connect to IRC servers using XChat available at xchat.org (Windows or Linux) or XChat Azure available on the Mac App Store.

irc.freenode.org hosts several retrotechnology-related channels including #C64, ##amiga, ##atari, #retro-computing and #classiccmp

www: ftp:

www.racketboy.com features articles on retrogaming, including collecting, and forums on various retro topics including a marketplace.

ftp://ftp.apple.asimov.net/pub/apple_II/ features a gigantic collection of vintage Apple II software and documentation organised by category.

www.lemon64.com hosts games and reviews on thousands of classic Commodore 64 games. It also features a gallery of graphics, a music archive and a collection of game box art.

THE BBS LIST
internet resources

facebook

CED Magic looks back at the SelectaVision video disc system, a video record player!

Apple II Enthusiasts is one of the largest retro-computing groups on Facebook with over 5000 members.

Members of the 8-Bit Computer Clique Facebook group post about all sorts of early 1980s computers, including new product announcements.

If you're looking to discuss anything more recent, Retro Machines allows members to talk about any computer more than a decade old.

AtariAge is the home for classic Atari videogaming, including the 2600 and Atari 8-bit computers.

I Am A Classic Videogamer covers all vintage consoles and arcade games with news and reviews.

twitter

DataDoor (@datadoor) posts PETSCII art and 8-bit computer generated music.

C64audio (@C64Audio) is working on a multifaceted project related to Commodore 64 musician Rob Hubbard, including a book, game and music.

Antoine Vignau (@antoine_vignau) is an Apple IIGS programmer who posts and retweets about all kinds of Apple II stuff.

Digital archivist Jason Scott (@textfiles) posts about current news and events in the retrotechnology community. You should also follow his cat, @sockington

Yesterbits (@yesterbits) has a feed chock-full of retrocomputing goodness.

Retro Computing Roundtable (@RCRPodcast) releases monthly podcasts that delve into various aspects of the retrotechnology community including events, new products, auctions for vintage hardware and more.

4am (@a2_4am) releases a constant stream of previously unarchived Apple II software.

BBS bulletin board systems

Once you have a telnet client, you can discover a broad list of BBSes at www.telnetbbsguide.com

Here's a sampling of a few of them:

A 80's Apple II BBS: a80sappleiibbs.ddns.net:6502

This BBS is running on a live working Apple II serving data off of real floppy disks. Because of that only one user can connect at a time, so if at first you don't succeed, try again later (just like the old days!)

Absinthe BBS: absinthe.darktech.org

In contrast, this multiline Amiga-based BBS has multi-user chat and gaming.

Capitol Shrill: capitolshrill.com

Harkening from a bit later in the genesis of bulletin-board systems is this Synchronet BBS.

You may have thought dial-up bulletin-board systems died out in the 1990s, but they've lately made a resurgence, accessible over the Internet using telnet clients such as PuTTY, available from www.putty.org

Telehack: telehack.com (telnet and web)

Telehack is slightly different from other BBSes – it's a game that looks and acts like the early Internet. Users (players) go on quests that typically require them to hack into (fictional) servers and BBSes to recover files and complete other tasks.

YYZ BBS: yyzbbs.no-ip.org:65

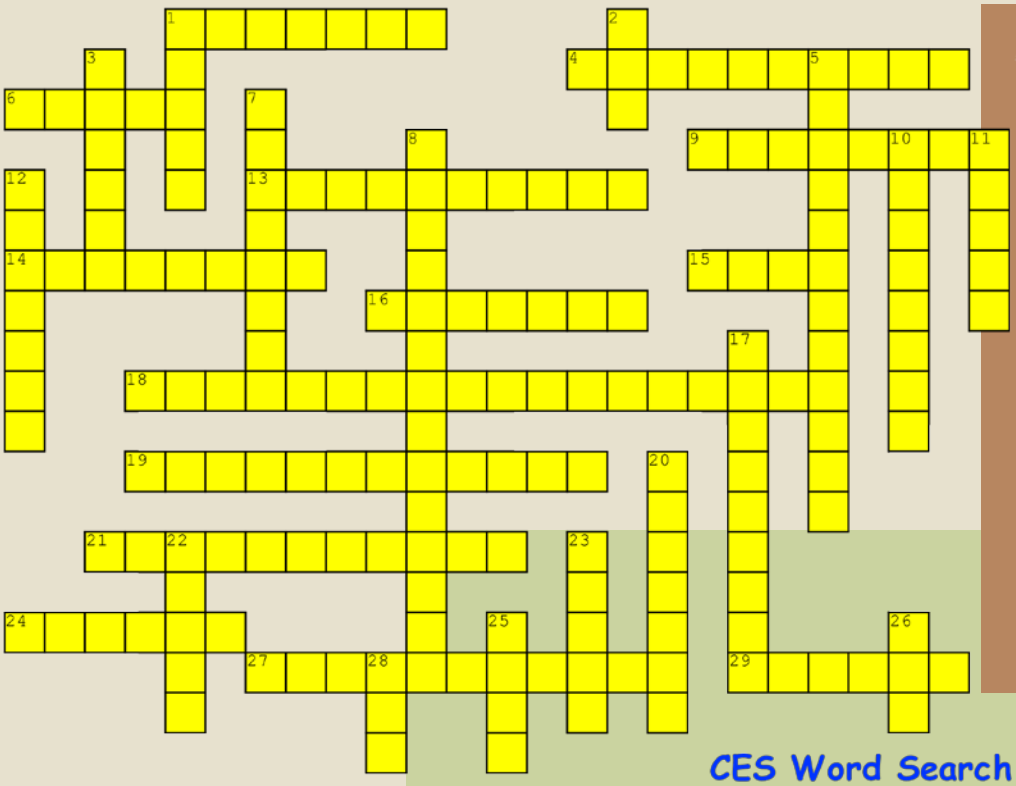
YYZ BBS is an Atari 8-bit bulletin-board system that was originally online in 1987-1988.

Happy BBSing!

The Fun Zone!

CES Crossword Spectacular!

See if you can decipher this crossword, containing subjects from this issue of Paleotronic!
(2 word answers do not include spaces)



Across

1. Used vector graphics instead of pixels.
4. To view images over a distance.
6. Speak and...
9. Sega's sprocket. (2 words)
13. Interactive fiction pioneer. (2 words)
14. Someone who buys things.
15. To demonstrate something.
16. Nintendo's male offspring. (2 words)
18. Fancy name for a text adventure. (2 words)
19. Four channel sound.
21. Commodore 64's on-line service. (2 words)
24. Apple's flop.
27. Devices which use transistors, microchips and other components.
29. Predecessor to Guitar Hero (2 words)

Down

1. Another name for a vacuum tube.
2. Acronym for Nintendo's 8-bit console.
3. Apple fell on his head.
5. The brains of the operation. (2 words)
7. Holds video and audio tape.
8. Computer Chronicles guy. (2 words)
10. Allows you to play old games on new computers.
11. Uses electromagnetic waves to transmit sound.
12. A place for storing things so they aren't forgotten.
17. Maker of Windows.
20. The Jackintosh. (2 words)
22. A Spanish female friend, also a computer.
23. Beginners All-Purpose Symbolic Instruction Code.
25. Atari's first video game hit.
26. Commodore's furry computer.
28. Acronym for the display type in older TVs.

CES Word Search Spectacular!

Once you do the crossword, try to find all the answers in this word search!

N	O	S	M	A	D	A	T	T	O	C	S	C	X	U	K	O	H	P	N
J	K	E	L	E	C	T	R	O	N	I	C	S	G	G	H	Y	O	Z	V
N	U	B	E	A	O	G	G	V	R	X	Y	O	B	E	M	A	G	G	P
O	K	Y	T	T	H	E	K	E	Y	U	J	I	O	M	S	E	N	G	P
I	Q	I	N	T	E	R	A	C	T	I	V	E	F	I	C	T	I	O	N
S	U	R	E	E	F	A	D	T	C	A	R	C	H	I	V	E	C	K	M
I	A	P	Q	F	E	B	H	R	A	L	R	E	K	A	P	X	U	Q	E
V	N	A	Z	I	T	G	T	E	Z	G	C	A	T	Y	Z	N	X	U	C
E	T	O	Z	E	J	J	P	X	R	B	I	A	G	L	R	J	Z	A	O
L	U	M	P	H	I	W	V	Y	B	N	R	M	S	L	O	Z	G	D	F
E	M	M	E	C	N	K	X	R	Z	I	M	H	A	E	T	N	J	R	B
T	L	R	O	T	R	T	F	O	S	B	O	M	D	P	A	I	T	A	Q
W	I	P	U	R	W	E	W	T	F	W	Q	D	L	S	L	P	F	P	Z
R	N	G	T	A	V	E	M	P	B	H	I	Y	D	T	U	P	O	H	U
X	K	H	C	W	V	Y	J	U	A	R	A	D	I	O	M	I	S	O	I
N	R	I	Y	E	J	Y	C	A	S	S	E	T	T	E	E	P	O	N	V
W	C	Q	T	T	H	K	X	A	I	N	P	F	T	C	C	H	R	I	A
N	K	S	K	S	P	L	J	E	C	J	O	O	Q	U	Q	S	C	C	L
N	E	W	T	O	N	N	H	A	G	V	X	C	N	C	O	D	I	Y	V
P	S	X	F	J	R	A	E	G	E	M	A	G	H	G	U	R	M	Z	E

"The Bugs" was a series of comics printed in UK computer magazine Crash, about a race of anthropomorphised software "bugs" that resided inside of a game-developer's computer. This particular episode was published in December 1986, and is apparently part of a story where the Bugs plot to take over the magazine.

Ziggy ("the video game designer", and not the big-nosed 1971 comic strip character), Joyshticks and The Video Kid are taken from an issue of Video Games, an American magazine, published in December of 1982.

The Ziggy comic appears to foreshadow the 1983 video-game crash, making a joke about how games were becoming derivative, while Joyshticks contains a gag about then-US president Ronald Reagan, who starred in "Bedtime for Bonzo", a 1951 movie wherein Reagan's character attempts to teach human morals to Bonzo, a chimpanzee, raising him like a child.

Finally, The Video Kid rounds out this Fun Zone's collection of comics with the titular arcade gamer-extraordinare being pestered by a loudmouthed, talentless bully.

Come back next time for more word games and historical comics! (And maybe a flowchart murder mystery...)

PARTING SHOT

ZERO PAGE

...continued from page 2

We deeply thank the original creators, authors and illustrators and hope that we can do justice to their efforts by giving their works another life in our pages. We are also proud to become "yet another magazine" on a deep and storied pile of previous magazines, and hope that we can be a vehicle to get eyeballs in front of all of them once again.

Our intent is not to make a substantive profit off the backs of others, only to ensure that electronics and computing history is not forgotten, and we beg forgiveness if anyone feels slighted by our attempts – please contact us at editor@paleotronic.com and we won't use any of your works in the future. But we hope it never comes to that, and are grateful for your understanding.

Thank you for reading, and we hope you enjoy (or have enjoyed, depending on how you got to this point) the rest of this issue! If you would like to browse an extensive collection of vintage magazines, please check out The Magazine Rack on the Internet Archive at:

https://archive.org/details/magazine_rack

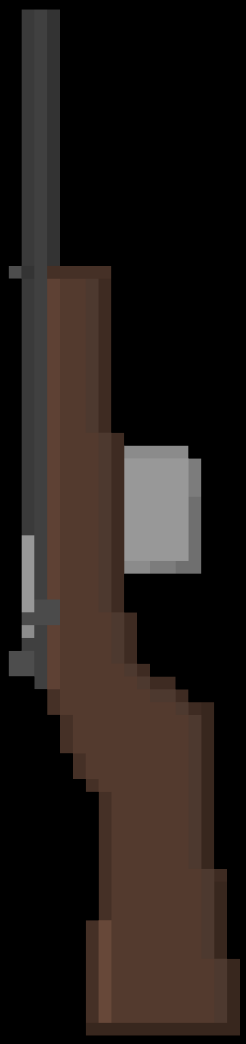
Help them live on, and give them (and us) a home – in your brain!

— the staff

Thanks for joining us on our whirlwind tour of the life and times of the Consumer Electronics Show! We hope you had a good time and learned something new – I did, I learned typesetting a hundred pages is hard work! (I know, I know... "quit your complaining"... In all seriousness though, I loved it.)

In the next issue of Paleotronic Magazine, we'll be taking aim at the wonderful world of video – we'll examine how images came to be displayed on CRT screens, how early computers and video-game consoles generated graphics and how later ones revolutionised the movie industry, how television cameras work and how their signals are broadcast, notable video games and TV shows that were milestones in video history, early digital cameras, and much much more.

That about wraps it up for this issue of Paleotronic! Thanks again to all of those who contributed to our Kickstarter, and we hope you feel it was worth it. We look forward to meeting you again in the pages of our next issue.



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Editor: Melody Ayres-Griffiths
Sub-Editor: Sean McNamara
Technical Consultant: April Ayres-Griffiths
Writer: Paul Monopoli

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